Neighborhood Effects on Primary Care Access

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Acknowledgments

Abstract

Individual health outcomes differ greatly between neighborhoods and recent research has begun to examine neighborhood environmental effects on individual health. A common hypothesis is that inequitable distribution of healthcare resources, limits access to health care for individuals in disadvantaged neighborhoods, causing poorer long-term health. Yet, research has not examined if the neighborhood environment actually affects an individual's ability to access primary care. Using data from the Los Angeles Family and Neighborhood Survey (L.A. FANS), I found significant variation among neighborhoods in an individuals' ability to access to primary care. This neighborhood-level effect is not explained by the composition of individuals living in the neighborhood. I then examine four potential mechanisms that may explain how the neighborhood environment affects primary care access: 1) neighborhood information networks, 2) neighborhood health behavior norms, 3) neighborhood social capital and 4) neighborhood health care resources. Social capital and health care resources significantly predict an individual's primary care access. Differential primary care access is a potentially important mechanism explaining how the neighborhood environment affects individual health. Policies designed to improve primary care access must account for both individual and neighborhood effects.

Abstract word count: 184

Keywords: neighborhood environment; primary care; healthcare access

Full word count: 7,976

Introduction

Individuals who live in poorer and more disadvantaged neighborhoods have poorer health outcomes (Acevedo-Garcia, 2000; Pickett & Pearl, 2001; Robert, 1999). Furthermore, the association between the neighborhood environment and individual health is not explained by the composition of individuals living in different neighborhoods. Several reviews of studies using multi-level analysis have concluded that neighborhood SES continues to have an independent effect on a wide variety of individual health outcomes even when controlling for individual SES and other individual characteristics (Ellen, Mijanovich, & Dillman, 2001; Pickett & Pearl, 2001; Robert, 1999). Thus, researchers have recently argued for a more thorough investigation of mechanisms linking the neighborhood environment to individual health. Differences between neighborhoods in the availability of structural resources, including healthcare, have led researchers to hypothesize one mechanism is decreased access to and use of health care (Macintyre, Ellaway, & Cummins, 2002). This paper examines whether restricted primary care access is a plausible mechanism.

Primary Care and Health Outcomes and Community Effects on Accessing Healthcare

Primary care access and use improves individual and population level health (Blumenthal, Mort, & Edwards, 1995; Epstein, 2001; Lurie et al., 1986; Macinko, Starfield, & Shi, 2003; Shi, 1994). For example, Blumenthal et al. (1995) argues access to primary care helps individuals better control routine illnesses and decreases hospitalizations, and Mackinko et al. (2003) found societies with stronger primary care systems have lower all-cause mortality and lower cause-specific mortality, such as deaths due to cardiovascular disease.

Furthermore, primary care may help alleviate disparities in health outcomes due to socioeconomic disparities (Casanova & Starfield, 1995; Shi, Starfield, Kennedy, & Kawachi,

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1999; Shi, Starfield, Politzer, & Regan, 2002). Shi et al. (2002) examined the effect of primary care on self-rated health. In predictions of self-rated health, high quality primary care attenuated the negative effect on health of high income inequality in state of residence after controlling for individual characteristics and primary care physician supply (Shi et al., 2002). Similarly, Shi et al. (1999) found that although income inequality of states based on the Gini coefficient significantly predicted all-cause mortality, once models controlled for primary care physician supply, income inequality was not a significant predictor of all-cause mortality. Thus, increased access to primary care can reduce the negative effects of income inequality on health (Shi et al., 1999).

However, individuals' ability to access healthcare is influenced by where they live. An individual's Metropolitian Statistical Area (MSA) has been found to affect his or her healthcare access, even when controlling for differences in the composition of individuals living in these MSAs (Andersen et al., 2002; Cunningham & Kemper, 1998). Andersen et. al (2002) used the 1995 and 1996 National Health Interview Survey and found significant variation across MSAs in the odds of whether low-income children and adults visited a physician in the last year. Cunningham and Kemper (1998) found over a two-fold difference in the proportion of the uninsured who reported having difficulty accessing healthcare among MSAs included in the Community Tracking Study. MSAs are much larger than an individuals' actual neighborhood, and researchers have not examined these questions using a smaller geographic definition of neighborhood. Thus, despite the potential role of primary care in mediating the relationship between the neighborhood environment and individual health it is largely unknown if the neighborhood environment affects an individuals' primary care access.

This paper expands on previous research by directly showing that neighborhood (defined as census tract) environment affects an individual's primary care access. It also takes an initial look at the mechanisms linking the neighborhood environment and individual primary care access by examining the effects of neighborhood information networks, health behavior norms, social capital and health care resources on primary care access.

Neighborhood Environment and Primary Care

Neighborhood information networks may encourage individuals to use primary care. Past research has found that information networks among peers influence an individual's decision to seek preventive care (Earp et al., 2002; Levy-Storms & Wallace, 2003). Levy-Storms and Wallace (2003) examined the effect of informal health communication networks on the likelihood of receiving a mammogram among Samoan women in Los Angeles. Women who were the most central in these networks had over three times the odds of reporting a recent mammogram compared to women who were not connected to these networks in their church. Strong neighborhood information networks may have similar effects on primary care access.

Primary care access and use is another health behavior, like not smoking and the neighborhood environment has been found have an independent on individual health behaviors (Ellen et al., 2001). If an individual lives in a community with strong social norms about the practice of positive health behaviors, he or she may be more likely to obtain primary care. Curry, Wagner, Cheadle, Diehr, Koepsell, Psaty et al. (1993) found that community level attitudes towards smoking and healthy diet significantly predicted individuals' attitudes towards these behaviors independent of individual characteristics (Curry et al., 1993).

Neighborhood social capital may increase primary care access through collective efficacy, direct functional support, and psychosocial effects. Social capital results from aspects

of the social structure that facilitate collective action (Kawachi & Berkman, 2000; Subramanian, Kim, & Kawachi, 2002). Neighborhoods with greater social capital may have greater collective efficacy, which consists of high mutual trust among neighbors and the expectation that neighbors will work towards the common good (Sampson, 2003). This collective efficacy may help keep the healthcare system accountable to the community (Hendryx, Ahern, Lovrich, & McCurdy, 2002; Steinberg & Baxter, 1998). Steinberg and Baxter (1998) conducted a qualitative case study of 12 Metropolitian Statistical Areas (MSAs) in the Community Tracking Study. MSAs with greater social capital and collective efficacy, such as residents having common values towards healthcare, were more effective at holding the local healthcare system accountable to the needs of the MSAs, such as protecting access to care among vulnerable populations (Steinberg & Baxter, 1998). Individuals in neighborhoods with greater social capital have greater trust in healthcare institutions (Ahern & Hendryx, 2003) and they may be more likely to use those institutions. Individuals living in neighborhoods with high amounts of collective action may also have more social interaction. This may lead to direct functional support that increases primary care access. For example, neighbors could provide child care while an individual goes to the doctor. Finally, social capital may also increase individual self-esteem (Kawachi & Berkman, 2000) and in turn affect the importance people place on their health and their likelihood of seeking primary care.

Neighborhoods also differ in their ability to financially support healthcare providers. Areas with greater wealth have more health care resources (Jiang & Begun, 2002). The types of industries in a community affect healthcare resources since certain types of employers are more likely to provide private health insurance coverage, which has higher reimbursement rates than public insurance (Brown, Ponce, & Rice, 2001; Cunningham & Ginsburg, 2001; Komaromy,

Lurie, & Bindman, 1995). Populations with a greater percentage of the very young or elderly may demand more healthcare since these ages have greater healthcare needs, bringing more providers to an area (Cunningham & Kemper, 1998; Jiang & Begun, 2002). Thus, the spatial distribution of healthcare resources is far from equitable with severely disadvantaged neighborhoods, such as inner cities, having fewer healthcare resources (Fossett, Perloff, Kletke, & Peterson, 1992; Grumbach, Coffman, Young, Vranizan, & Blick, 1998; Salsberg & Forte, 2002).

This study examines if the above neighborhood characteristics influence an individual's primary care access. I hypothesize individuals living in a neighborhood with stronger information networks, stronger social norms against negative health behaviors, greater social capital and more health care resources will have better primary care access.

Methods

Data Source

Analyses are based on Wave 1 of the 2000-2001 L.A. FANS, a survey of adults, children, and neighborhoods in a stratified probability sample of census tracts in Los Angeles County. For sample, the 1652 Los Angeles County census tracts in 1990 were divided into very poor, poor and non-poor strata based on percent in poverty. A total of 65 tracts were sampled: 20 each from the very poor and poor strata and 25 from the non-poor stratum. Within each sampled tract, 40-50 dwelling units were sampled at random, with an oversample of households with children. Within each household, L.A.FANS-1 randomly sampled one adult (age 18 and older) for interview. Interviews were conducted in English and Spanish. A total of 2,623 adult respondents were interviewed. For more details, see Sastry, Ghosh-Dastidar, Adams and Pebley (2003).

This analysis was limited to randomly selected adults (RSAs) under age 65. Adults over 65 and children have greater health needs that lead to different healthcare utilization patterns than working age adults.

Outcome Measures

The two measures of primary care access are 1) having a regular source of care (RSOC) at the time of interview and 2) receiving a preventive check-up in the last two years. Having a RSOC has been consistently linked to high quality primary care, such as receiving check-ups or preventive screenings, experiencing positive health behavior changes and reporting greater patient satisfaction (Bindman, Grumbach, Osmond, Vranizan, & Stewart, 1996; Cornelius, Smith, & Simpson, 2002; Ettner, 1999; Weiss & Ramsey, 1989). Respondents who reported having a doctor's office, clinic, health center, health maintenance organization (HMO) or hospital outpatient department for receiving a physical were classified as having a RSOC. Respondents who reported no RSOC, went to the hospital emergency room for a physical, or gave friends or family members as their RSOC were classified as having no RSOC. Eighty percent of the sample had a RSOC at the time of interview (Table 1).

Simply having a RSOC does not guarantee primary care use. I also predicted receiving a preventive check-up anytime during the previous two years. This timeframe was chosen based on previous primary care research (Brown, Ojeda, Wyn, & Levan, 2000) and on current guidelines for frequency of preventive screenings (e.g. hypertension) (National Guideline Clearinghouse-www.guideline.gov). Using the month and year RSAs last went to the doctor for a check-up, I determined whether or not a check-up was received in the two years prior to the interview. Seventy-one percent of the sample received a check-up in the last two years (Table 1).

Individual Level Control Variables

This paper examines whether the neighborhood environment affects individual primary care access even when controlling for individual characteristics. Table 1 gives the distribution of the individual control variables that were selected based on the Andersen Behavioral Model of Health Services Use and past research predicting primary care access (Andersen, 1995; Bloom, Simpson, Cohen, & Parsons, 1997; DeVoe, Fryer, Phillips, & Green, 2003; Joung, Meer, & Mackenbach, 1995; Woloshin, Schwartz, Katz, & Welch, 1997). Having a RSOC was included as a predictor of receiving a check-up.

I estimate the odds of receiving a check-up anytime during the two years before the interview although some individual characteristics may have changed during these two years. For check-up analyses, I included the status of the individual characteristics at the beginning of the two year period using information collected in a two year retrospective history in L.A. FANS-1 for all individual characteristics that may have changed except education, language of interview, family income, smoking status, chronic conditions and having a RSOC. Sensitivity analyses of limited retrospective information on smoking, education and family income showed little change over the two year period in these characteristics. For RSOC analyses I included individual characteristics at the time of interview. The final samples predicting receiving a check-up and having a RSOC were 2,081 and 2,042, respectively due to differences in missing data for time variant characteristics.

Neighborhood Level Independent Variables

Table 2 gives the distribution and categorization of neighborhood characteristics from L.A. FANS-1 and Census 2000. RSAs were asked questions about their neighborhood environment and their level of disapproval of different health behaviors. Individual responses

within each census tract were averaged to generate a mean score for the entire census tract that was assigned to all individuals living in the same tract. Several neighborhood scores were dichotomized based on their distributions. For example, neighborhoods where people strongly agreed that neighbors were willing to help each other (neighborhood score<2) were compared to neighborhoods where people agreed, were neutral or disagreed that people were willing to help each other (neighborhood score>=2). L.A. FANS-1 was collected during 2000-2001 so neighborhood socioeconomic measures from Census 2000 were also included in the models to supplement attitude measures with more objective measures of the neighborhood environment. Due to redefinition of census tracts between 1990 and 2000, characteristics of 90 tracts are included.

The four mechanisms through which neighborhood characteristics are hypothesized to affect primary care access are: 1) information networks, 2) health behavior norms, 3) social capital and 4) health care resources. Measures of information networks include education level from Census 2000, the frequency that neighbors ask advice from one another and the number of neighbors individuals spoke to in the last 30 days from L.A. FANS-1. Individuals may learn more about healthcare opportunities and practices by talking to highly educated neighbors who can effectively navigate the healthcare system.

Health behavior norms are measured by neighborhood approval of adults regularly smoking cigarettes. This item came from the Monitoring the Future Study (www.monitoringthefuture.org), a yearly study measuring youth health behaviors and attitudes and was modified to ask about adult behaviors. The response options were do not disapprove, disapprove and strongly disapprove. L.A. FANS-1 also measured disapproval of binge drinking and marijuana use for adults over 18. These measures were excluded because it is unclear if the

questions are measuring attitudes towards health behaviors or illegal activity (18 years old was included in the question for drinking).

Measures used in L.A. FANS-1 to measure social capital and information networks were derived from the Project for Human Development in Chicago neighborhoods (Sampson, 2003). L.A. FANS-1 measures neighborhood collective efficacy, such as the level of mutual trust between neighbors (e.g. neighborhood is close knit) and perceived norms of reciprocity (e.g. willingness to help neighbors), and measures of direct social interaction and functional support (e.g. number of friends living in neighborhood). Residential stability and whether there is a dominant ethnic group (either white or Latino; no neighborhoods were predominantly Black or Asian-Pacific Islander) in the neighborhood from Census 2000 are measures of population homogeneity and stability.

Finally, a direct measure of healthcare resources, such as primary care physician supply, is not included in the models due to the low-quality of the limited data that is available for healthcare resources at the census tract level. Instead, neighborhood measures that proxy availability of healthcare resources are included. These include the median income of tracts, the age structure of the population and whether the neighborhood is severely disadvantaged from Census 2000. A measure of severely disadvantaged neighborhoods was constructed by comparing neighborhoods in the highest quartile of percent of population in both poverty status and unemployment from Census 2000 to all other neighborhoods.

Analyses

Statistical analyses were completed using STATA 8.0 updated with the GLLAMM program for the random effect multi-level models (Rabe-Hesketh, Pickles, & Skrondal, 2001; Statacorp, 2003). Analyses are weighted using weights created for the L.A. FANS-1 randomly

selected adults (Sastry and Pebley 2003). These weights adjust for sample design and eligibility and for differential non-response.

To answer the question of whether the neighborhood environment affects primary care access even when controlling for individual characteristics, I used a fixed effects multi-level logit model that includes both individual characteristics and a fixed effect for neighborhood. The fixed effect was included as a dummy variable for each census tract. A χ^2 tested if the dummy variables for neighborhood as a group were significant. If significant, the neighborhood environment affects primary care access independent of individual characteristics.

I also ran a fixed effect model that only includes dummy variables for each tract. Using both this model and the fixed effects model discussed above that included tract dummy variables and individual characteristics, I generated the predicted neighborhood mean of having a RSOC or check-up. For each of these models I calculated the variance of the predicted neighborhood means. The change in variance of the predicted means between these two models is the proportion of the between neighborhood variance that is due to differences in the types of individuals that live in different neighborhoods (i.e. composition).

Fixed effects models do not give insight into which neighborhood characteristics affect primary care access. Thus, I used a random effects multi-level logit model to examine how the neighborhood environment affects primary care access. This model includes the individual and neighborhood characteristics from Tables 1 and 2 in the actual model. The random effect serves as an indirect control for neighborhood factors not included in the models that may affect primary care access.

Finally, I estimated how much of the neighborhood variation in primary care access is explained by the neighborhood factors included in the random effect model. I ran the fixed

effects model discussed above and estimated neighborhood predicted means setting all individual characteristics at their mean. I then used the neighborhood level characteristics from the random effects model to predict these neighborhood means in a linear regression. The R^2 from this linear regression shows how much of the neighborhood variation is explained by the neighborhood measures included in the random effects model.

Results

Does the Neighborhood Environment Affect Primary Care Access?

Figure 1A and 1B shows the percent of each tract that reports having a RSOC and receiving a check-up in the last two years. There is a large amount of variation between neighborhoods. Across all neighborhoods, the proportion of the population with a RSOC ranged from 12 to 100%, while this proportion ranged from 14 to 100% for receiving a check-up. The average number of respondents per tract is 23 for RSOC and 24 for receiving a check-up.

The significant variation between neighborhoods remains in multi-level models. In models that include individual characteristics and a fixed effect for neighborhood, there was significant variation between neighborhoods for both outcomes (χ^2=135.55, p=0.0003-RSOC; χ^2=159.09, p=<0.001-check-up). Therefore, the neighborhood environment has an independent effect on an individual's ability to access primary care even when controlling for individual characteristics.

Furthermore, the variance of the predicted means by neighborhood changes little between a model that includes only a fixed effect for neighborhood and a model that includes both a fixed effect for neighborhood and individual characteristics. In models predicting having a RSOC, the variance decreases from 1.3404 to 1.007 when individual characteristics are included, a 25% reduction. For receiving a check-up in the last two years, this variance decreases from 0.9341 to

0.8980, a 4% reduction. These results imply little of the neighborhood effect on primary care access, especially for receiving a check-up, is due to the composition of individuals in the neighborhood.

Random Effect Multi-level Logit Model

Since the neighborhood environment independently affects an individual's primary care access, I examine how this occurs. Table 3 shows the adjusted odds ratio and 95% confidence intervals of the random effects logit multi-level model predicting having a RSOC and receiving a check-up in the last two years. For both outcomes, results agree with past research that emphasizes the importance of enabling factors, such as education, or income and need factors, such as having a chronic condition, when predicting healthcare access (Andersen, 1995; Bloom et al., 1997; Cornelius et al., 2002; Joung et al., 1995; Schoen & DesRoches, 2000). Individuals with health insurance coverage are significantly more likely to have a RSOC and receive a check-up compared to those without insurance, and individuals with a RSOC had over six times the odds of receiving a check-up compared to those without a RSOC.

Neighborhood Characteristics

Neighborhood information networks do not significantly predict having a RSOC. Respondents living in the third quartile of neighborhoods with percent of the population with at least a high school education are significantly less likely to receive a check-up in the last two years compared to respondents living in a neighborhood in the lowest quartile of neighborhood education level. There is also a significant negative association between number of neighbors spoken to in the last month and receiving a check-up.

An increase in smoking disapproval from do not disapprove to disapprove or disapprove to strongly disapprove increases the odds of having a RSOC almost 4 times, which borders on

significance (p<0.10). No effect of health behavior norms is seen when predicting receiving a check-up.

For both outcomes, several measures of social capital are significant in contradictory directions. Living in neighborhoods where people are willing to help their neighbors causes individuals to have almost four and over two times the odds of having a RSOC and receiving a check-up, respectively, compared to individuals in neighborhoods where people are less willing to help their neighbors. However, respondents in neighborhoods where neighbors do favors for one another more often have significantly lower odds on both outcomes compared to people in neighborhoods where neighbors do favors for each other less often. Individuals in the second and third quartile of the most residentially stable neighborhoods, as measured by the percent of the tract that lived in the same house five years ago, had significantly higher odds of reporting a RSOC compared to individuals in neighborhoods with the least residential stability.

Healthcare resources have no effect on having a RSOC but do significantly predict receiving a check-up in the last two years. Individuals living in a tract with a high percentage of the population over 65 have almost two times the odds and individuals living in severely disadvantaged areas have a 58% lower chance of receiving a check-up compared to individuals living in neighborhoods with a lower population of residents over 65 and individuals living in less disadvantaged environments.

Finally, the neighborhood characteristics in Table 3 explain 41% of the variation between neighborhoods in RSOC and 36% of this variation for receiving a check-up in the last two years. These estimates are based on the R^2 from the linear regression using the neighborhood characteristics to predict estimated neighborhood means when all individual characteristics are set to their mean.

Conclusion

Neighborhood Environment Affects Primary Care Access

Researchers have often hypothesized that one mechanism through which the neighborhood environment affects individual health is decreased access to healthcare (Acevedo-Garcia, 2000; Ellen et al., 2001; Macintyre et al., 2002). Despite this being a common hypothesis, little research has examined whether the neighborhood environment independently affects an individual's ability to access healthcare after controlling for individual characteristics, such as health insurance coverage.

These analyses show that the neighborhood environment significantly affects having a RSOC and receiving a check-up in the last two years (Figure 1). In multi-level fixed effect logit models that control for individual characteristics, significant variation between neighborhoods remains, indicating that the neighborhood environment affects primary care access even when controlling for individual characteristics. Furthermore, the between neighborhood variance changes little once individual characteristics are included in a model that includes a fixed effect for neighborhood. Therefore, the significant neighborhood effect is not "explained away" by differences in the composition of individuals living in different neighborhoods. Although the significant effect of neighborhood may be due to individual characteristics that are not explicitly controlled for in the models, this is unlikely since most individual characteristics commonly associated with primary care access are included. Results did not change when including more extensive individual controls, such as drinking behavior (data not shown).

How Does the Neighborhood Environment Affect Primary Care Access?

To investigate how the neighborhood environment has a significant effect on primary care access, I considered four mechanisms: 1) information networks, 2) health behavior norms, 3) social capital and 4) healthcare resources.

Neighborhood social capital affects primary care access, but the specific mechanism is not clear from these results. Neighborhood social capital may influence individuals' primary care access by increasing the odds of neighbors providing direct functional support; but this does not appear to be the case. Measures of neighborhood interaction including neighborhood information networks and frequency neighbors do favors for one another are not significant or have a negative association with primary care access (Table 3). Individuals living in neighborhoods with greater residential stability have significantly higher odds of having a RSOC, which may be a proxy for increased social interaction between neighbors. However, this also may be because individuals who move may take some time to find a new RSOC, causing neighborhoods with a high percentage of recent moves to have a lower proportion of the population with a RSOC.

The lack of a need for direct functional support and interaction for neighborhood social capital to influence primary care supports Sampson's theory of collective efficacy (Sampson, 2003). Individuals living in neighborhoods where people strongly agree neighbors are more willing to help each other are significantly more likely to have a RSOC and receive a check-up compared to individuals living in neighborhoods where people are less likely to agree that neighbors are willing to help each other. Thus, increased neighborhood collective efficacy may increase an individuals' primary care access. However, other measures of collective efficacy

such as "neighborhood is close-knit" border on having a negative association with both outcomes (p<0.10) which argues against this hypothesis.

Future research should determine if collective efficacy affects primary care, and if so how. For example, it may increase an individuals trust in healthcare institutions (Ahern & Hendryx, 2003), or it may increase individual self-esteem (Kawachi & Berkman, 2000) which may in turn affect the importance individuals place on their health. Individuals living in neighborhoods with strong social cohesion may have more positive attitudes towards their life chances, which may positively affect their views on how important it is to take care of their health and adhere to positive health behaviors (Ellen et al., 2001; Siegrist, 2000), such as seeking out primary care. For example, Mitchell, Gleave, Bartley, Wiggins and Joshi (2000) found that individuals who felt they were part of their community had significantly higher physical health outcomes when controlling for individual and neighborhood characteristics, such as deindustrialization. In this study, a significant interaction between increased smoking disapproval and living in a neighborhood where neighbors are more willing to help each other was found to significantly increase the odds of having a RSOC. However, the estimate was unstable due to small cell sizes (data not shown). Future research should further investigate this hypothesis.

Going to a health provider for a check-up is a different process than seeking out a RSOC, and the neighborhood mechanisms differ between these two processes. For example, increased smoking disapproval borders (p<0.10, Table 3) on significantly increasing the odds of having a RSOC but does not predict receiving a check-up. Healthcare resources emerged as an important mechanism accounting for the effect of the neighborhood environment on actually using preventive care use but did not predict having a RSOC. Individuals living in neighborhoods with

the highest percent of the population over age 65 were significantly more likely to receive a check-up in the last two years, and individuals living in a severely disadvantaged neighborhood were significantly less likely to report receiving a check-up. Individuals living in neighborhoods in the highest quartile of median income and percent of the population less than 5 years old border ($p<0.10$) on being significantly more likely to receive a check-up (Table 3). This finding supports past research that found low-income adults and children living in an MSA with a community health center were significantly more likely to report visiting a physician in the past year even when controlling for individual factors, such as health insurance coverage (Andersen et al., 2002), and future research should continue to examine the importance of availability of healthcare resources.

Finally, the neighborhood characteristics included only explained about 40% of the variation between neighborhoods in primary care access, and future research should consider how other aspects of the neighborhood environment influence primary care access. For example, characteristics of neighborhoods that impede individuals from getting to the doctor may be important. Individuals in neighborhoods with poorer public transportation or in neighborhoods that are perceived as unsafe may be less likely to get a check-up because it is difficult to get to a medical provider (Braveman, Marchi, Egerter, Pearl, & Neuhaus, 2000) or because they have fears about their safety when traveling to their doctor. Balfour and Kaplan (2002) found that elderly living in neighborhoods with poor access to public transportation were significantly more likely to report a decline in physical functioning and hypothesize this may be due to the inability of the elderly in these neighborhoods to attain needed services (Balfour & Kaplan, 2002). Additional factors such as these should be included in future investigations of neighborhood effects on primary care access.

Policy Implications

       The neighborhood environment affects an individual's ability to access primary care. However, it does not displace the importance of policies that remove barriers impeding individuals from accessing the healthcare system. Having health insurance significantly predicts both outcomes, and having a RSOC is a strong individual predictor of actually receiving a check-up in the last two years even when controlling for neighborhood characteristics. Public policies that increase individuals' access to the healthcare system, such as increasing insurance coverage or providing individuals with a RSOC, will significantly increase an individuals access to, quality and use of primary care (DeVoe et al., 2003).

       However, since neighborhood independently affects primary care access policies that focus on changing the neighborhood environment may also increase primary care access. For example, if neighborhood social capital influences individuals' primary care access through collective efficacy and individual self-esteem, community empowerment programs that organize community members and build their collective efficacy may also increase individuals' access to primary care. Policies that ensure the equitable distribution of health care resources across neighborhoods will also increase primary care access.

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Table 1: Distribution of Individual Level Controls; L.A. FANS 2000-2001, Adults aged 18-64 years old

	Total % or median of the sample (SD)[a]		Total % or median of the sample (SD)
Outcome Measures		*Predisposing Factors*	
Has a RSOC[b]		Marital status	
Yes	80	Never married	38
No	20	Married	49
Received a check-up in last two years		Divorced or widowed	13
Yes	71	RSA has child aged 0-5 in household	
No	29	Yes	24
Individual Covariates		No	76
Predisposing Factors		Employment status	
Gender		Unemployed	26
Male	51	Working full time in high status occupation	30
Female	49	Working full time in low status occupation	32
Race		Working part time	12
Latino	40	Current smoker	
White	34	Yes	34
Black	10	No	66
Asian/Pacific Islander or Other	16	*Enabling Factors*	
Age		Language of interview	
Less than 25 years old	22	English	76
25-50 years old	61	Spanish	24
51-64 years old	17		

Table 1 Continued: Distribution of Individual Level Controls; L.A. FANS 2000-2001, Adults aged 18-64 years old

Individual Covariates	Total % or median of the sample (SD)		Total % or median of the sample (SD)
Enabling Factors		*Enabling Factors*	
Educational attainment		Reported $0 for non-housing assets	
Less than high school	22	Yes	13
High school graduate	23	No	87
Some college	31	Insured	
College graduate or post graduate	23	Yes	70
		No	30
Median yearly family income	$36,001 (83,625)		
Reported $0 for family income		*Need Factors*	
		Has chronic condition[c]	
Yes	3	Yes	33
No	97	No	67
			N=2,081[b]

[a] Unweighted N's and weighted percentages and medians were reported. Percentages may not add up to 100 due to rounding. SD=Standard Deviation

[b] Except for the percentage of respondents that have a RSOC all percents and medians are based on the sample of individuals who received a check-up (n=2,081). There is little difference in the basic descriptive statistics between these two samples.

[c] Respondents were classified as having a chronic condition if they reported ever being told by a doctor they had high blood pressure, diabetes, cancer, chronic lung disease, heart attack, coronary heart disease, arthritis, asthma and major depression.

Table 2: Hypothesized Mechanism, Distribution and Categorization of Neighborhood Level Variables Used to Predict Primary Care Access; Census 2000 and L.A. FANS 2000-2001 (Adults 18-64, ,n=90)

Neighborhood Characteristic	Mean or % (SD)	Categorization
Information Networks		
Percent with high school or more education[a]	54.5 (23.1)	Quartiles
Frequency neighbors ask advice	2.80 (0.29)	Often (1) or sometimes versus rarely or never (4)
Number of neighbors talked to in last 30 days[b]	2.37 (0.23)	Linear ranging from 1 (none) to 4 (6 or more)
Health Behavior Norms		
Adult smoking[b,c]	2.33 (0.18)	Linear ranging from 1 (do not disapprove) to 3 (strongly disapprove)
Social Capital		
Percent in same house 5 years ago[a]	49.8 (10.4)	Quartiles
Predominant ethnic group[a]	63.3	Predominantly white or Latino versus no predominant group
Neighborhood is close-knit[b]	2.89 (0.39)	Strongly agree (1) or agree versus unsure, disagree or strongly disagree (5)
People are willing to help neighbors[b]	2.38 (0.35)	Strongly agree versus agree, unsure, disagree or strongly disagree
Neighbors do not share same values[b]	3.07 (0.35)	Strongly disagree, disagree or unsure versus agree or strongly agree
Neighbors can be trusted[b]	2.67 (0.46)	Strongly agree or agree versus unsure, disagree or strongly disagree
Friends living in neighborhood[b]	1.93 (0.23)	None (1) versus a few, many, most or all (4)
Frequency neighbors do favors for one another[b]	2.33 (0.30)	Often (1) versus sometimes, rarely or never (4)
Healthcare Resources		
Income[a]	$40,861 ($25,728)	Quartiles
Percent age 65 or older[a]	7.8 (4.8)	Highest quartile versus lowest three quartiles
Percent age 5 or younger[a]	10.9 (3.2)	Highest quartile versus lowest three quartiles
Highly disadvantaged neighborhood[b]	15.6	Tracts in highest quartile of both unemployment and poverty versus all other

[a] From Census 2000
[b] Variables from L.A. FANS-1 measuring neighborhood attitudes are based on questions asked to RSAs in the adult module. A mean score for each neighborhood was calculated by averaging all

of the individual responses in the same tract. This mean score was assigned to each individual in the census tract.

[c] The question about smoking disapproval was also asked of another adult in the household, who may be a different person than the RSA. The mean score for neighborhood included responses from all respondents living in the same neighborhood.

Table 3: Adjusted Odds Ratios and 95% Confidence Intervals of Multi-level Random Effect Logit Models Predicting Having a RSOC and Receiving a Check-up in the Last Two Years; L.A. FANS 2000-2001, (Adults aged 18-64 years old)[a]

Individual Characteristics	Has a RSOC (n=2,042)		Received a check-up in the last two years (n=2,081)	
	AOR[b]	95% CI	AOR	95% CI
Predisposing Factors				
Male (ref=female)	0.28 [c]	(0.17, 0.47)	0.36 [c]	(0.23, 0.57)
Race (ref=Latino)				
White	0.82	(0.43,1.58)	0.85	(0.49, 1.49)
Black	1.00	(0.44, 2.24)	2.12	(0.84, 5.37)
Asian/Pacific Islander or Other	0.42 [d]	(0.18, 1.00)	0.59 [d]	(0.34, 1.02)
Marital status (ref=never married)				
Married	1.45 [d]	(0.94, 2.24)	0.97	(0.65, 1.43)
Divorced or widowed	1.42	(0.70, 2.89)	1.46 [d]	(0.96, 2.21)
Employment status (ref=unemployed)				
Working full time in high status occupation	0.88	(0.50, 1.55)	0.45 [c]	(0.25, 0.79)
Working full time in low status occupation	1.60 [d]	(0.93, 2.74)	0.74	(0.46, 1.19)
Working part time	0.91	(0.39, 2.14)	0.58 [d]	(0.32, 1.05)
Enabling Factors				
Education (ref=less than high school)				
High school graduate	1.42	(0.88, 2.29)	1.15	(0.68, 1.95)
Some college	1.26	(0.69, 2.27)	1.49	(0.79, 2.81)
College graduate or post graduate	2.73 [c]	(1.19, 6.24)	2.58 [c]	(1.31, 5.09)
Interviewed in English (ref=Spanish)	1.72 [c]	(1.00, 2.96)	0.84	(0.50, 1.41)
Log of family income	1.35 [c]	(1.06, 1.71)	0.97	(0.77, 1.23)
Has health insurance (ref=uninsured)	5.64	(3.43, 9.28)	1.53 [c]	(1.04, 2.24)
Reports having a RSOC (ref=no RSOC)	-----	-------	6.62 [c]	(4.40, 9.96)
Need Factors				
Has chronic condition (ref=no chronic condition)	2.20 [c]	(1.39, 3.49)	1.87 [c]	(1.18, 2.95)

Table 3: Adjusted Odds Ratios and 95% Confidence Intervals of Multi-level Random Effect Logit Models Predicting Having a RSOC and Receiving a Check-up in the Last Two Years; L.A. FANS 2000-2001, (Adults aged 18-64 years old)[a]

Neighborhood Characteristics	Has a RSOC (n=2,042)		Received a check-up in the last two years (n=2,081)	
	AOR	95% CI	AOR	95% CI
Information networks				
Percent of tract with high school or greater education (ref=tract in Q1-lowest)				
Q2	0.98	(0.58, 1.64)	0.69	(0.42, 1.15)
Q3	1.23	(0.65, 2.32)	0.51[c]	(0.29, 0.91)
Q4- highest	1.07	(0.36, 3.18)	0.44[d]	(0.17, 1.16)
Neighbors ask advice more often (ref=neighbors ask advice less often)	0.83	(0.50, 1.38)	0.95	(0.63, 1.43)
Number of neighbors talked to in last 30 days; Linear ranging from 1 (none) to 4 (6 or more)	0.62	(0.20, 1.87)	0.31[c]	(0.12, 0.78)
Health behavior norms				
Adult smoking; Linear ranging from 1 (do not disapprove) to 3 (strongly disapprove)	3.60[d]	(0.95, 13.59)	1.94	(0.75, 5.08)
Social capital				
Percent of tract in same house five years ago (ref=tract in Q1-lowest)				
Q2	1.92[c]	(1.15, 3.21)	0.68[d]	(0.44, 1.06)
Q3	2.20[c]	(1.29, 3.72)	0.74	(0.49, 1.11)
Q4-highest	1.84[d]	(0.98, 3.46)	0.72	(0.45, 1.17)
Dominant ethnic group (ref=no)				
Yes	0.65[d]	(0.41, 1.06)	0.92	(0.63, 1.33)
Neighborhood is more close-knit (ref=neighborhood is less close knit)^	0.83	(0.49, 1.38)	0.68[d]	(0.46, 1.01)
People are more willing to help neighbors (ref=people are less willing to help neighbors)	3.94[c]	(1.66, 9.37)	2.46[c]	(1.32, 4.59)
Disagree that neighbors do not share same values (ref=agree that neighbors do not share same values)	0.71	(0.46, 1.09)	0.74	(0.50, 1.09)
Neighbors can be trusted (ref=neighbors are less trustworthy)	0.99	(0.59, 1.66)	1.31	(0.87, 1.97)
Friends living in neighborhood (ref=no friends in neighborhood)	0.93	(0.64, 1.35)	1.13	(0.85, 1.50)
Neighbors do more favors for one another (ref=neighbors do fewer favors)	0.35[c]	(0.17, 0.71)	0.58[c]	(0.35, 0.98)

Table 3: Adjusted Odds Ratios and 95% Confidence Intervals of Multi-level Random Effect Logit Models Predicting Having a RSOC and Receiving a Check-up in the Last Two Years; L.A. FANS 2000-2001, (Adults aged 18-64 years old)[a]

| Neighborhood Characteristics	Has a RSOC (n=2,042)		Received a check-up in the last two years (n=2,081)	
	AOR	95% CI	AOR	95% CI
Healthcare Resources				
Median income (ref=tracts in Q1-lowest)†				
Q2	0.59	(0.27, 1.31)	1.09	(0.58, 2.04)
Q3	0.84	(0.40, 1.75)	1.39	(0.80, 2.39)
Q4-highest	0.57	(0.24, 1.35)	1.76 [d]	(0.93, 3.34)
Tract in highest quartile (Q4) of percent of population aged 65 or older (ref=Q1-Q3)	1.28	(0.75, 2.19)	1.75 [c]	(1.11, 2.75)
Tract in highest quartile (Q4) of percent of population under age 5 (ref=Q1-Q3)	1.49	(0.75, 2.95)	1.67 [d]	(0.92, 3.03)
Highly disadvantaged neighborhood (ref=not highly disadvantaged neighborhood)	1.37	(0.59, 3.20)	0.42 [c]	(0.21, 0.86)

[a]The model also controls for variables listed in Table 1 including, age, having children under 5, , reporting no family income, reporting no assets and smoking habits.
[b]AOR=adjusted odds ration; CI=confidence interval
[c]Significant at $p<0.05$
[d]Significant at $p<0.10$

Figure 1A: Percent of tract with a RSOC; L.A. FANS-1 2000-2001 (Adults 18-64 years old, n=2,042)[a]
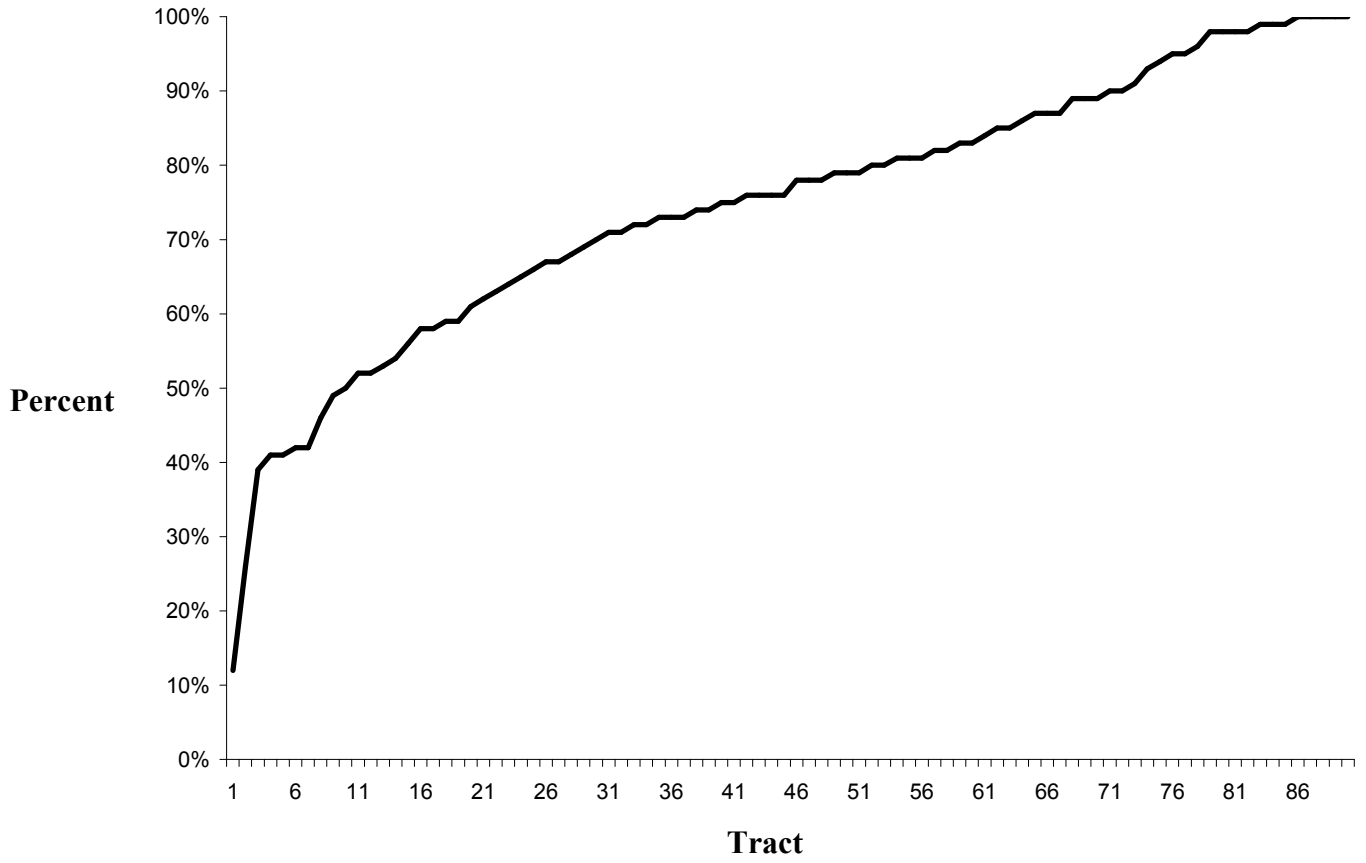
[a] The mean number of respondents per tract is 23. Tracts with 100% have a range of 2 to 33 people.

Figure 1B: Percent of tract receiving a check-up; L.A. FANS-1 2000-2001 (Adults 18-64 years old, n=2,081)[b]
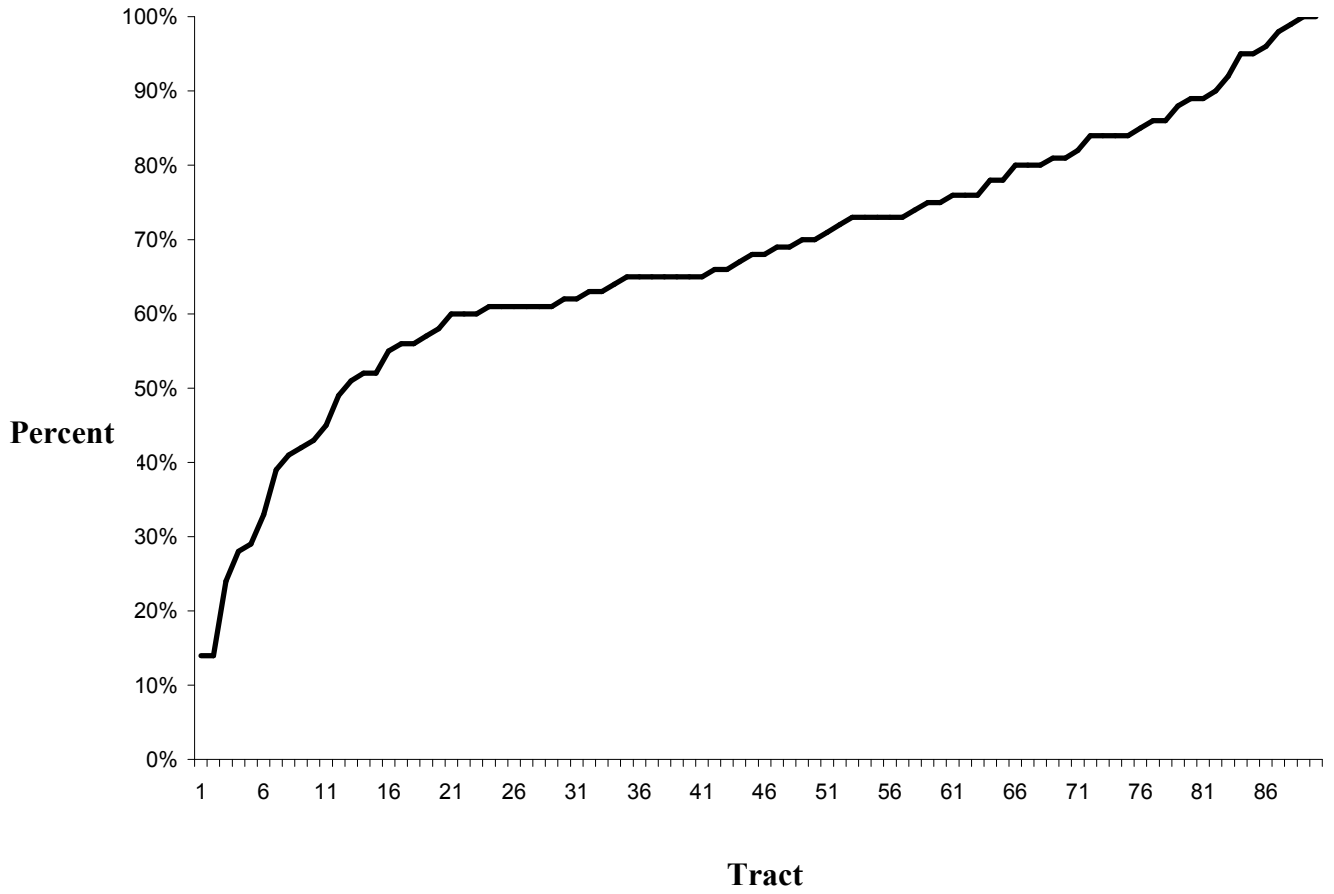
[b] The mean number of respondents per tract is 24. Tracts with 100% have a range of 2 to 9 people.