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Place as a predictor of health insurance coverage: A multivariate analysis of counties in the United States

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Abstract

This study assessed the importance of county characteristics in explaining county-level variations in health insurance coverage. Using public databases from 2008 to 2012, we studied 3112 counties in the United States. Rates of uninsurance ranged widely from 3% to 53%. Multivariate analysis suggested that poverty, unemployment, Republican voting, and percentages of Hispanic and American Indian/Alaskan Native residents in a county were significant predictors of uninsurance rates. The associations between uninsurance rates and both race/ethnicity and poverty varied significantly between metropolitan and non-metropolitan counties. Collaborative actions by the federal, tribal, state, and county governments are needed to promote coverage and access to care.

Keywords

Insurance coverage; Health care access; County government; Health reform

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1. Introduction

1.1. U.S. counties, insurance coverage, and national health reform

During 2013, 46.0 million persons of all ages (14.8%) were uninsured in the United States (U.S.), 34.5 million (11.1%) had been uninsured for more than a year, and 57.4 million (18.5%) had been uninsured for at least part of the year prior to interview (National Center for Health Statistics, 2013). Causes of uninsurance in the same year included the continued decline in private coverage, growing unemployment, the economic recession, and rising costs of health care (National Center for Health Statistics, 2013). Expanding health insurance coverage in the U.S. is critical to addressing the persistent health inequalities suffered by low to middle income children and adults, racial/ethnic minorities, and medically underserved communities.

Evidence on the adverse consequences of being uninsured demonstrates the important role that coverage plays in increasing timely, affordable, and quality health care. In 2009, the Institute of Medicine reviewed this evidence and highlighted the harmful effects of uninsurance in the U.S., including preventable illness, suffering, and even death (Institute of Medicine, 2009). Children and adults who have health insurance are more likely to enjoy access to a usual source of care, preventative screenings, prescription medications, and early diagnoses of chronic conditions (Institute of Medicine, 2009).

While other U.S. health reform efforts have failed, the 2010 Patient Protection and Affordable Care Act (PPACA, or ACA) is the first landmark health reform effort that was signed into law (PPACA, 2010). The ACA was enacted with the goals of increasing the affordability of health insurance, lowering the uninsured rate by expanding public and private insurance coverage, and reducing the costs of healthcare for individuals and the government. In addition, the ACA intended to close the gaps in the nation's private–public insurance system by providing subsidized private coverage for individuals with incomes up to 400% of poverty. Under the ACA, states may opt to expand Medicaid to all non-Medicare eligible individuals less than 65 years old whose adjusted gross income is less than 138% of the federal poverty level. States will receive increased federal funding to finance newly covered individuals through 2019, but then the states' share of costs will increase (Kaiser Family Foundation, 2013). For individuals, tax credits and subsidies are available to aid low- and middle-income Americans in the purchase of insurance through the marketplace where individuals and small businesses can compare insurance plans and purchase coverage. Enrollment via the marketplace is mandatory and those without coverage must pay a tax penalty. Despite federal incentives to close the health insurance coverage gap, partisan politics and reluctance by state governors to expand public coverage and to subsidize employer-sponsored coverage have impeded the efforts at the state level.

In the meantime, the nation's 3143 counties continue to serve as an important locus of access to care for the uninsured, the underinsured, and those covered under medically indigent adult programs (Hall et al., 2012; Kelch, 2004; Mays and Smith, 2009; Meyer et al., 1999; Waitzkin, 2005). Some counties operate public hospitals and community health centers that provide services to these populations, whereas many other counties do not.

Certain counties contribute their own funds to the care of medically indigent adults and others lacking insurance coverage, whereas other counties do not allocate such funds.

Partly because counties remain “forgotten governments” in research and policy analyses (Benton, 2003), national- and state-level proposals for improving health care access usually have not considered current policies and potential interventions at the county level. In fact, the ACA minimally recognizes county governments as partners in achieving successful reform and overlooks the varying conditions of health care access and uninsurance among counties (National Association of City and County Health Officials, 2011).

The lack of attention that counties have received in health policy reform proposals is surprising in light of policies enacted in other countries and in the U.S. that might serve as models of innovation. For instance, in the Swedish national health program, counties retain major responsibility and authority for the delivery of services, including primary care, hospitalization, and public health functions (Swedish Institute, 2012). Additionally, other European countries emphasize counties or similar units of local government in their national health programs (World Health Organization, 2006). In the United States, counties engage in a range of programs to improve access for the uninsured. As only three examples, Santa Clara County, California, King County, Washington, and Hennepin County, Minnesota, have implemented improvements in health insurance and models of local service coordination (Health Access Foundation, 2013; Sandberg et al., 2014; Wong, 2003).

Limited previous research has recognized county-level variations in access to care (including insurance coverage), health service delivery and utilization, and population health outcomes. Certain studies have assessed the impact of county-level characteristics on health care access in specific states (Basu et al., 2006; Basu and Mobley, 2007; Brown, 2006; Ezzati et al., 2008; Hayanga et al., 2009; Sparks et al., 2009). Other researchers have addressed variation in health outcomes and systems and policy performance at the county level, including mortality inequalities, mental health outcomes, insurance coverage, hospitalization for conditions preventable by ambulatory care, and the impact of specific policies such as Medicaid managed care (Radley et al., 2012; Knepper, 2012; Waitzkin, 2008, 2010). A study published by the Commonwealth Fund examined variation across 306 hospital regions in measures of access, prevention, and treatment; potentially avoidable hospital use and cost; and healthy lives (Radley et al., 2012). Findings demonstrated wide gaps in “people’s ability to gain access to care in different communities around the country and strong associations between access and health care quality, including the receipt of preventive care” (Radley and Schoen, 2012). Another study analyzing 123 responses from county government administrators and elected officials from 2009 to 2010 showed a direct and positive association between county government influences (types of relationships between county officials and safety-net providers, frequency of contact between county officials and providers, and number of community-oriented health organizations) and local network performance (access to health care, care coordination, and health information exchange; Knepper, 2012).

Although existing literature examines key measures of local health care access and variation of health system performance across the U.S., less is known about what explains that

variation. For instance, the impacts of local political orientation and structural factors such as safety-net resource capacities warrant further clarification. Although recent efforts have created databases that provide helpful county-level indicators of health care access and outcomes, analyses of these data have not yet produced an overall picture of what may explain inter-county variability (Robert Wood Johnson Foundation and University of Wisconsin, 2014; U.S. National Center for Health Statistics, 2014). In multi-level research, some investigators have studied variations in important health outcomes using units of analysis smaller than the county, such as census tract and neighborhood, but these smaller units generally do not entail differences in policy making orientation like those that can occur at the county level (cf. O'Campo et al., 2015). We aimed to address the relative lack of evidence about county-level variations by merging data from publicly available sources and examining the relationships between county characteristics and health insurance coverage as one important component of health care access (Hall et al., 2008).

1.2. Conceptual approach and hypotheses

Conceptually, we approached this work from several theoretical perspectives. First, we considered Andersen's behavioral model of health services utilization to examine contextual determinants of access (Andersen, 1995). From this model we included two predictors of health access: 1) individual-level race/ethnicity and income, which Andersen and others have identified as important determinants of access and utilization; and 2) community-level characteristics including the structure of safety-net services in a geographic area.

Second, from the standpoint of critical social geography, we focused on the structural differences among geographical units that account for inequity in resources, inequality in outcomes, and marginalization of populations depending on "place" (Harvey, 2006). Harvey has applied this perspective to studies of social policy differences and their effects at different levels of analysis, including nation, region, city or town, and neighborhood. He and others who have pursued this line of work have referred to the general problem as "uneven development." Although work on social determinants of health services and outcomes has focused partly on geographical differences at the state, county, and neighborhood levels, such studies have not used an overall theory of uneven development (Harvey, 2006).

A third conceptual dimension in the study involved ideology and beliefs. This perspective, which emphasized the impact of ideology and beliefs on economic behavior, derived partly from perspectives in the sociology of the economy, by such authors as Weber (1958), Sutton et al. (1956), and Smelser (1976). A key perspective from this work emphasized the substantial impact that non-economic motivations exert in leadership decisions, especially by elected officials. Thus, we selected voting patterns as a proxy for the political ideology of elected officials, who predictably based their policy decisions on beliefs regarding reliance on market-oriented health systems, as opposed to reliance on government in assuring access through public subsidies.

In our conceptual approach, we expected that sociodemo-graphic characteristics, uneven development, and political ideology interact in shaping health insurance coverage patterns at the county level. For instance, wealthy counties may initiate restrictive policies about health care coverage, depending on local decision makers' beliefs. These conceptual strands shaped

the methods that we selected to assess and to explain county-level variations in health insurance coverage.

Our research assessed the relative importance of such characteristics in explaining county-level variations in health care access. Our study aimed: 1) to analyze how health insurance coverage varies across U.S. counties; and 2) to assess whether county characteristics are major predictors of health insurance coverage. We tested two hypotheses: H1: A wide variability in health insurance coverage exists among U.S. counties; and H2: Counties' structural capacities (socioeconomic characteristics and health system resources), demographic characteristics (proportion of ethnic and racial minorities), and political ideologies (as reflected in county voting patterns) are major predictors of county-level variations in health insurance coverage.

2. Methods

2.1. Data measures and sources

With the county as the unit of analysis, we studied the 3143 counties located in the 50 states of the U.S. We extracted public use county-level data from the U.S. Census Bureau (U.S. Census Bureau, 2010). Race and ethnicity measures (percentages of non-Hispanic White, non-Hispanic Black, Hispanic, Asian/Pacific Islander, and American Indian/Alaskan Native [AI/AN] residents in a county) and median age were taken from the Census 2010 decennial census. Percentages of votes cast for major party (Republican and Democratic) candidates for president in the 2008 election were taken from compilations available from the U.S. Census Bureau (2013b) USA Counties project. Education (percentage of residents over age 25 with high school education or more), poverty (percentage of residents below the federal poverty level), median household income, and non-elderly (under age 65) health insurance coverage measures were taken from five-year estimates available from the U.S. Census Bureau (2013a) 2008–2012 American Community Survey (ACS). For the purposes of our analysis, these five-year estimates were based on the median year of the 2008–2010 ACS survey. As measured in the ACS, health insurance status reflects current coverage from public and private sources and does not reflect access to health care services through non-insurance-based federal programs such as the Indian Health Service.

We focused on the population 65 years of age or younger, since most of the elderly above 65 years of age are covered under Medicare. Decennial census and ACS data were available for all 3143 counties or county equivalents (3142 when excluding Washington, D.C.) located in the 50 states of the United States. However, voting data from USA Counties were not available for 30 counties, including the 29 county equivalents in Alaska and Kalawao County, Hawaii (which coincides with Kalaupapa National Historical Park, the site of the former Kalaupapa Leper Settlement), bringing our final sample of U.S. counties to 3112. County equivalents were local units of government similar to counties, such as Louisiana parishes, and federally designated county-like areas used by the Census for statistical purposes.

We also used several non-Census data sources. The unemployment rate (for persons over the age of 16) for 2010 was taken from the Bureau of Labor Statistics (2011). Metropolitan area

status was taken from data provided by the U.S. Department of Agriculture's (USDA) Economic Research Service (Economic Research Service, 2013), which designates a county as part of a metropolitan statistical area if it has an urban core of at least 50,000 residents or strong commuting links to a county with such an urban core. The USDA ERS, in this case, follows the U.S. federal government's Office of Management and Budget guidelines for metropolitan classification based on data provided by the Census on population in 2010 and commuting patterns in 2006–2010. Finally, two measures of health professional availability which are related to our demographic measures but also capture aspects of county-level resource availability that are not determined by demographics were taken from sources provided in the Health Resources and Services Administration's (Health Resources and Services Administration, 2013) Area Health Resource File. In particular, counties were considered primary care Health Professional Shortage Areas according to HRSA criteria if there were more than 3500 persons per physician across the county in 2010 or if there were more 3000 persons per physician and unusually high needs for primary care. The number of Federally Qualified Health Centers per 10,000 residents was calculated by taking a count of organizations within a county receiving grants via the Public Health Service Act, Section 330, in 2010, divided by the county's 2010 Census population, and multiplied by 10,000.

2.2. Statistical analysis

We used descriptive statistics to examine inter-county variability in county characteristics and health insurance coverage and bivariate correlations to examine associations between county characteristics and health insurance coverage rates. To address the geographic nesting of counties within states and to allow for variability in the strength of county-level associations across states, we used a two-level hierarchical linear regression model allowing for both random intercepts and random coefficients for state-level effects on county-level predictors. Prior to refining this random effects model, we compared initial random effects regression coefficients to a fixed effects model and examined the magnitude of the intra-cluster correlation coefficient to assess the appropriateness of this modeling strategy. Since the focal unit of analysis for this study was the county, while we allowed for state-level random effects, we did not include specific state-level predictors in this analysis. Also, while our two-level model allowed for arbitrary patterns of spatial autocorrelation between counties within states, it did not account for possible spatial autocorrelation between counties across states.

To avoid problematic multi-collinearity, in cases where pairs of variables were found to have Pearson's correlation coefficients of magnitude greater than 0.7, the variable with the larger association with health insurance coverage rates was used in the regression model, and the proportion of non-Hispanic Whites was excluded from the model due to the high degree of association of this variable with the sum of the remaining race and ethnicity measures. In order to highlight county-level heterogeneity and to investigate whether the magnitude of the impact of predictors on uninsurance varied significantly between metropolitan and non-metropolitan counties, interaction terms between metropolitan area status and other model variables were included in regression models in a stepwise fashion. First, individual interaction terms were included with other variables in initial models which also included random effects for all regression coefficients. Then, significant interaction terms were

included together with all other variables in subsequent models and interaction terms which then became non-significant were dropped using backward selection. Once specification of variables and interaction terms for the regression model was complete, a “tear down” approach was then used to exclude, successively, random effects with very small (less than 10^{-12}) or relatively small (less than two standard errors) estimates for variance parameters. By excluding such small effects, we were able to improve both convergence and stability of maximum likelihood estimates, as well as to arrive at a reasonable and parsimonious final multi-level model (Hox, 2010).

Post-estimation analyses included calculation of Ω_0^2 statistics as a measure of the proportion of variance explained by the model and the use of Wald tests to determine the significance of linear combinations of variables with their interaction terms. Also, the statistical significance of the impact of metropolitan area status for the “average” county was determined using a *t*-test for the difference in marginal means, calculated at mean values for other variables, between metropolitan and non-metropolitan counties. All statistical analyses were conducted using Stata 13.1 (StataCorp, 2013). Statistical tests were two-tailed, and the threshold for statistical significance was set, per convention, at $\alpha=0.05$.

3. Results

3.1. Health insurance coverage and county characteristics

Table 1 presents an overview of inter-county variability in health insurance coverage and pertinent county characteristics, as well as correlations between county characteristics and rates of uninsurance. The data revealed marked inter-county variability in health insurance coverage, ranging from 3.0% to 52.9% uninsured. Substantial variability also appeared for other county characteristics, as reflected by wide gaps between maximums and minimums and relatively large standard deviations. For instance, Republican percentage of Hispanics ranged from 0.0% to 95.7%, with a standard deviation of 13.2%. Percentage of votes also exhibited wide variability, with a range of 9.9% to 92.6% and a standard deviation of 13.8%.

In the bivariate analyses at the county level (Table 1), we found several important relationships. Relatively large positive correlations occurred between uninsurance and the percentage of persons in poverty (0.56) and the percentage of Hispanics (0.40). Large negative correlations emerged between uninsurance and median household income (−0.49), education (−0.60), and percentage of non-Hispanic Whites (−0.48). Smaller, yet still highly significant, positive associations were also observed between uninsurance and Health Professional Shortage Area designation, number of Federally Qualified Health Centers [FQHCs] per population, ethnicity measures (proportions of non-Hispanic Blacks and American Indian/Alaskan Native), and Republican voting. Smaller, yet still highly significant, negative associations were observed between uninsurance and the proportion of Asian/Pacific Islanders, median age, metropolitan area status, and Democratic voting.

Examination of counties with extremely high or extremely low uninsurance rates revealed some specific geographic patterns. Counties in the Southwest border states tended to show some of the highest uninsurance rates in the nation, including 7 of the 20 counties with the

highest observed rates of uninsurance. For instance, Texas counties included Starr (44.6%), Maverick (40.3%), and Hidalgo (40.2%). New Mexico counties included McKinley (42.2%). The Louisiana parish of Tensas had the highest rate of uninsurance (52.9%) and was one of three parishes in the state of Louisiana that ranked among the 20 counties with the highest observed rates of uninsurance. On the other hand, Massachusetts contained 10 of the 20 counties with the nation's lowest rates of uninsurance. These counties included Norfolk (3.0%), Hampshire (3.5%), and Worcester (4.0%).

3.2. County characteristics as predictors of uninsurance rates

Table 2 presents the results from the multi-level regression model. As in the bivariate analysis, poverty, unemployment, Republican voting, and percentages of Hispanic and American Indian/Alaskan Native) residents in a county emerged as signifi-cant predictors, associated with higher uninsurance rates. Median age also emerged as a significant predictor associated with higher uninsurance rates (as noted earlier, our measure of uninsurance only considered persons younger than 65 years of age). Education and metropolitan area status remained significant predictors of lower uninsurance rates. The relationships between uninsurance and both poverty and race/ethnicity measures differed significantly between metropolitan and non-metropolitan counties. For instance, poverty and Hispanic ethnicity showed a stronger association with higher uninsurance rates in metropolitan counties than non-metropolitan counties.

The proportion of explained variance at the county level for this multi-level model was 76.3% by the Ω_0^2 statistic, which considers state-level variance components included in the model as explained variance at the county level. The observed intraclass correlation for the base random-intercept model in this two-level analysis was 46.5%, strongly indicating the appropriateness of the multi-level modeling strategy (Cohen et al., 2002). In addition, while initial comparisons between random and fixed effects models did show some significant differences in estimated coefficients, aside from the coefficient for Republican voting, these differences were relatively small. The fact that the initial fixed effects model showed a significantly smaller coefficient for Republican voting indicates that some caution should be exercised in interpreting this result, due to possible bias in the coefficient estimate of our random effects model. Several substantive random effects also emerged in the multi-level model. In particular, the regression coefficient associated with unemployment exhibited the largest variance, reflecting the fact that, in our multi-level model, the association between unemployment and uninsurance varied widely across states. Hispanic ethnicity and median age also exhibited some variability in their relationship with uninsurance rates at the county level across states, although this variability was less than that of unemployment.

4. Discussion

4.1. Variability of insurance coverage based on place

We discovered profound variability among counties in health insurance coverage, as well as key characteristics of counties that predicted uninsurance. For the most part, the answers to our research questions largely confirmed our initial hypotheses. Counties showed a wide range of uninsurance rates, from 3% to 53%, signaling large disparities in health care access

by place. In some counties, uninsurance rates far exceeded state and national rates. For example, the uninsurance rate in the Louisiana parish of Tensas (52.9%) was more than three times the national rate (16.9%). In Starr County, Texas, and McKinley County, New Mexico, uninsurance rates (44.6% and 42.2%, respectively) were almost twice the state-level rates (Texas, 25.5%, and New Mexico, 22.4%).

In bivariate correlations and multi-level regression analysis, several characteristics emerged as important predictors of uninsurance. The proportions of racial/ethnic minority residents in a county (particularly Hispanics and American Indian/Alaskan Native, AI/ANs) were significant, positive predictors of uninsurance. Poverty and unemployment also significantly predicted uninsurance, as did, to a lesser extent, Republican voting patterns. Inversely, metropolitan area status and higher education predicted lower uninsurance. The magnitude of poverty and the proportion of racial/ethnic minority residents (non-Hispanic Black, Hispanic, and Asian/Pacific Islander) as predictors of uninsurance varied between metropolitan and non-metropolitan counties, and the magnitude of unemployment as a predictor varied across states.

Consistent with other research, we found that many of the counties with the highest rates of uninsurance were located along the U.S.-Mexico border, where about half the population is Hispanic (Bastida et al., 2008; National Center for Health Statistics, 2013). The border region is anchored in manufacturing, agribusiness, and service industries. These industries frequently do not offer employer-sponsored insurance coverage. Low-wage workers often cannot afford insurance premiums. Lower insurance rates among Hispanics also derive from differences in state labor markets, varying eligibility policies for public insurance, immigration status, and language barriers (Carrasquillo et al., 2000; Ku and Waidman, 2003; Weinick et al., 2004; Brown et al., 2009).

Counties with geographic boundaries overlapping those of tribal nations showed higher rates of uninsurance. About half of AI/ANs hold insurance coverage through jobs and/or other private options. However, most AI/ANs residing on reservations access health care through other means such as the Indian Health Service (IHS), tribally operated programs, or urban Indian services and resources centers (Indian Health Service, 2014). Because federal appropriations have decreased severely, these programs rely on third party reimbursements such as Medicaid, Children’s Health Insurance Program (CHIP), and private insurance (Indian Health Service, 2014).

Inter-county differences in voting patterns probably reflect variability in political ideologies that generate varying county-level policies regarding health care access. For instance, ideas about private market processes may motivate decision makers in some counties to withhold financial support from health services and/or to contract with private providers; such decisions may contribute to inter-county variations in insurance coverage. Research examining the impacts of national political-economic systems in shaping health policy has found that social democratic political traditions lead to redistributive policies such as universal health insurance coverage and that conservative regimes demonstrate less investment in public services (Beckfield and Krieger, 2009; Navarro et al., 2006). Ideological views concerning the relative desirability of policies that expand private market

activities versus government intervention affect a variety of public health policies worldwide (Waitzkin, Jasso-Aguilar, and Landwehr, 2005; Waitzkin, 2011); such diverging ideologies also may influence decision making about access to health services at the county level.

Regarding poverty, individuals and families are less likely to afford private insurance if they are poor and if they do not receive employer-sponsored insurance coverage. In addition, counties with large proportions of people living in poverty tend to have fewer public resources to provide insurance coverage, for example through medically indigent adult programs. Studies in social geography have focused on uneven economic development, by which geographic differences in poverty and economic resources account for variation in public policies (Chi and Leroux, 2012; Harvey, 2006). Geographical differences may shape community-level uninsurance rates, and high rates may create adverse consequences for the insured as well (Pagán and Pauly, 2006). Such adverse consequences for people with insurance include compromised service quality, poorer general health care access, and unmet medical needs (Robert, 1999). Our findings reinforce the importance of geographical differences in poverty rates as one apparent determinant of county-level variability in health insurance coverage.

4.2. Implications for research

Although most previous research has relied mainly on state-and national-level estimates, our findings illuminate the need for including county-level data collection and analyses to clarify barriers impeding health care access. This consideration applies especially as the ACA or later reform legislation takes effect. Detailed data on type of insurance, utilization, and barriers to access with the county as the unit of analysis remain unavailable for most counties from federally sponsored databases, such as those derived from the National Health Interview Survey (Cohen and Makuc, 2008) and Medical Expenditure Panel Survey (Agency for Healthcare Research and Quality, 2014). A more satisfactory understanding of county-level variation in health care access could emerge from national survey designs that include multiple measures of health care access for all counties at more frequent time intervals. Because national and state-level estimates mask local variation, governmental and philanthropic agencies should invest in collecting data and making valid county-level estimates more available. The California Health Interview Survey, for example, provides a model of how survey design can lead to more complete data on uninsurance and other access measures at the county level (Lavarreda et al., 2012).

4.3. Implications for health reform

As health reform unfolds in the U.S., state and federal governments will need to confront and to minimize inter-county variability of uninsurance rates for communities. Our results suggest that multilateral cooperation is needed to allocate resources more efficiently to counties with the most critical gaps in coverage. Compared with state and federal governments, some county and tribal governments probably are more capable of responding to the health needs of their residents and mobilizing grass roots leadership and resources to support local policy changes that enhance access (Brownson et al., 2010). Certain counties have tapped into revenue sources, such as taxes on fuel, telecommunications, utilities, and local sales, as well as franchise and impact fees, to enhance health care access (Howell and

Hughes, 2006; Taylor, 2009). These actions may increase counties' leverage in addressing health care needs and in negotiating between community values and sometimes competing federal, state, and private interests (Hooghe and Marks, 2003). Additionally, locally tailored programs may provide useful perspectives for other counties aiming to make affordable health insurance more widely available.

The responsibility for financing, delivery, and regulation of health care in the United States is shared jointly among federal, tribal, state, and county governments. Although this inter-governmental authority has comprised a cornerstone of the health care safety net, these relationships remain surprisingly varied. Shared authority to allow creative approaches for more efficient provision of local public services would strengthen implementation of national health reform (Beddoe, 2010; Peppard et al., 2008). However, as of August 2014, only 28 states are planning to implement the expansion of Medicaid (Kaiser Family Foundation, 2014b). In states like Texas which have chosen not to implement the expansion, many uninsured adults who would have been newly eligible for Medicaid will not gain a new coverage option and will likely remain uninsured (Kaiser Family Foundation, 2014b). As a result, we expect that substantial county-level variability in insurance coverage will persist under the ACA.

Based on our findings that highlighted the unequal gaps in coverage and considering the variation in state implementation efforts, we favor targeted inter- governmental efforts to coordinate outreach and enrollment in counties where the uninsurance rates are the highest. By mid-2014, approximately 8 million people had enrolled for coverage under ACA, but the ratio of those enrolled as opposed to those eligible to enroll varied widely by locality (Kaiser Family Foundation, 2014a). Enrollment for Hispanics in the four border states and for AI/ANs in tribal and urban areas remained very low compared to the number estimated as eligible to enroll (Kaiser Family Foundation, 2013). Counties and their respective state and tribal partners could "emphasize different targeting and enrollment strategies based on information about whether the counties have high or low rates of people losing public or private health insurance and high or low percentages of newly uninsured people who remain uninsured for more than two years" (Graves and Swartz, 2013). In fact, key provisions of the ACA provide financial incentives for state and local governments to work with local providers to expand outreach, enrollment, and messaging efforts through community health centers, schools, and trusted local networks (The Commonwealth Fund, 2012).

Such approaches may become promising implementation strategies for increasing access to care. In rural and frontier counties with high rates of uninsurance and AI/AN populations (such as we found with McKinley County, New Mexico), collaborative outreach efforts by tribal, county, and state governments also could improve access. In such locales, lack of information and limited transportation options exacerbate uninsurance rates among those who are eligible for publicly funded coverage. Strategies for implementing health reform should embrace inter-governmental solutions that consider the role of counties in enrolling residents, expanding insurance coverage, and assuring adequate local infrastructure for delivery of services. This consideration is also important because, in most states, county health departments retain frontline responsibility for protecting public health (National Association of City and County Health Officials, 2011).

4.4. Study limitations

Several issues arose as limitations in this study. We have not ascertained the precise causal mechanisms by which the characteristics of counties may affect lack of insurance. Our measure of health insurance coverage did not specify the type of coverage or other commonly used indicators, such as regular source of care, visits to a health professional, financial barriers to access other than insurance coverage, and non-financial barriers such as language and transportation. The study focused analytically on inter-county variability and did not include intra-county variability in coverage or intra-county determinants of coverage. Also, while the multi-level model used in this study indicated important state-level variability in the associations among certain county-level variables, we did not specify state-level characteristics that might explain some portion of this variability. Additionally, results showing higher rates of uninsurance for counties with overlapping jurisdiction on tribal geographic areas should be interpreted with caution given the complexity of coverage options for AI/ANs in the U.S.

Finally, although our study examined uninsurance rates, we acknowledge that insurance coverage is not enough to resolve inequalities in health care access. Future research should investigate the role of counties in addressing other social determinants of health care access such as transportation and employment, beyond the focus on financing health care services. Recent initiatives have mobilized local government involvement in tackling the roots of unequal access, such as chronic concentrations of unemployment, poverty, and unevenly developed public health infrastructures located in rural counties and in counties with large concentrations of racial/ethnic minorities. For instance, Alameda County, California, launched a Place Matters initiative that addresses community conditions through local policy change to address poor air quality, dilapidated housing, limited access to healthy food and parks, underfunded schools, and few economic opportunities (Schaff et al., 2013).

5. Conclusion

Our results indicate that counties vary widely in health insurance coverage. Predictors of insurance coverage at the county level include minority race and ethnicity, poverty, education, metropolitan area status, and voting patterns. Our findings suggest that inter-county variability in insurance coverage may reflect uneven economic development, differing local policies concerning access to services for low-income people and ethnic minorities, and ideological predispositions that lead county-level policy makers to make differing decisions about access to services. Policy interventions to reduce the number of uninsured in the U.S. will prove more effective if they look at a finer scale than national- and state-level uninsurance rates, to the disparate differences at the county level. Since high rates of uninsurance persist in some counties but remain low in others, policy interventions under the ACA and subsequent attempts at reform should consider the county as a fundamental unit of health insurance coverage and county jurisdictions as partners in implementing health reform and promoting equal access to care.

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Table 1

Health insurance coverage and county characteristics.

	Mean (SD)	Min	Max	Correlation with uninsured
Dependent variable: health insurance coverage				
Uninsured under age 65 (%)	17.8 (6.5)	3.0	52.9	
Independent variables: county characteristics				
Population and resources				
Metropolitan area status	0.4 (0.5)	0.0	1.0	−0.23***
Health professional shortage area	0.4 (0.5)	0.0	1.0	0.08***
Primary care designation				
Number of FQHCs per 10,000 residents	0.4 (1.0)	0.0	20.8	0.15***
Socio-demographic variables				
Median household income (in thousands of dollars)	45.5 (11.8)	19.6	122.8	−0.49***
Unemployment rate, persons over 16	9.2 (3.1)	1.6	29.9	0.25***
Poverty (% individuals below federal poverty level)	16.3 (6.4)	0.0	49.5	0.56***
Education (% persons over 25 with high school education or more)	84.1 (7.0)	44.9	97.5	−0.60***
Non-Hispanic White (%)	78.6 (19.6)	2.8	99.2	−0.48***
Non-Hispanic Black (%)	8.8 (14.5)	0.0	85.4	0.19***
Hispanic (%)	8.3 (13.2)	0.0	95.7	0.40***
Asian/Pacific Islander (%)	1.1 (2.3)	0.0	43	−0.16***
Native American (%)	1.6 (6.5)	0.0	94.1	0.28
Median age	40.4 (5.0)	22.4	62.7	−0.10***
Voting				
Democratic votes (%)	41.5 (13.8)	4.9	88.9	−0.16***
Republican votes (%)	56.8 (13.8)	9.9	92.6	0.18***

Note: FQHCs = Federally Qualified Health Centers

*p<0.05.

**p<0.01.

***p<0.001.

Table 2

Multilevel regression results: county characteristics as predictors of uninsurance rate with random coefficients for state level effects on county level predictors.

	Parameter estimate	95% CI
Variables[a]		
Constant	21.75***	(17.61, 25.90)
Metropolitan area status	−2.98***	(−3.75, −2.2i;
Health professional shortage area designation	−0.05	(−0.30, 0.21)
Number of FQHCs per 10,000 residents	0.04	(0.05, 0.29)
Unemployment rate, persons over age 16	0.17**	(0.05, 0.29)
Poverty (% individuals below federal poverty level)	0.19***	(0.15, 0.22)
Poverty * metro	0.10***	(0.05, 0.15)
Education (% persons over age 25 with high school education or more)	−0.22***	(−0.25, −0.19;
Non-Hispanic Black (%)	−0.01	(−0.03, 0.01)
N on-His panic Black *metro	0.03**	(0.01, 0.05)
Hispanic (%)	0.15***	(0.10, 0.19)
Hispanic*metro	0.03*	(0.00, 0.05)
Asian/ Pacific Islander (%)	−0.24*	(–0.44, – 0.05)
Asian/ Pacific Islander * metro	0.20*	(0.01, 0.38)
Native American (%)	0.25***	(0.22, 0.2s;
Median age	0.18***	(0.14, 0.22)
Republican votes (%)	0.03***	(0.02, 0.05;
Random effects variance components[b]		
Unemployment rate, persons over age 16	0.11	(0.06, 0.19)
Hispanic (%)	0.01	(0.01, 0.03)
Median age	0.01	(0.00, 0.01)
Residual	10.14	(9.64, 10.67)

Note: CI= confidence interval; FQHC= Federally Qualified Health Center.

[a]Parameter estimates represent regression coefficients.

[b]Parameter estimates represent variance estimates.

*$p<0.05$.

**$p<0.01$.

***$p<0.001$.