

COMMUNITY MATTERS: Exploring the Link Between Community Characteristics and Uninsurance in Massachusetts

DECEMBER 2016

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

INTRODUCTION 2

BACKGROUND AND METHODS 3

KEY FINDINGS..... 6

IMPLICATIONS..... 13

LIMITATIONS AND OPPORTUNITIES..... 14

TECHNICAL APPENDIX..... 15

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EXECUTIVE SUMMARY

Although Massachusetts had the lowest uninsured rate in the nation in 2015 at 2.8 percent,¹ pockets of high uninsurance in the state remain.² According to the combined 2010–2014 American Community Survey (ACS) data, the average uninsured rate in Massachusetts communities ranged from no measured uninsurance to a high of 18.8 percent. These differences have persisted despite nearly a decade of near-universal health insurance coverage in Massachusetts brought about by the state's 2006 health reform initiative and continuing under the 2010 federal Affordable Care Act (ACA). To better understand the geographic and community context of the remaining uninsured in Massachusetts and to provide data for better targeting of outreach and enrollment activities, we explored the relationship between community characteristics and the uninsured rate for people of all ages in Massachusetts communities. We focused on characteristics of the people living in the community (e.g., share below poverty, share Hispanic or not white) and physical characteristics of the community (e.g., distance to the nearest grocery store or supermarket, vacancy rate for housing units) as predictors of high uninsurance, defined as a community uninsured rate in the 90th percentile, which is 6.6 percent or higher, for Massachusetts.

We found that while many community characteristics were correlated with the community uninsured rate when considered independently, **poverty** and **household income** were the strongest predictors of high uninsurance when all community characteristics were considered together. Of course, poverty and household income are highly correlated with many other characteristics of the community, so these variables will capture many associated hardships that face low-income communities, including, for example, relatively low employment and more low-wage employment, low educational attainment, and competing needs, including housing. While research on the social determinants of health has often focused on associating physical characteristics of the community, such as the availability of fresh food, with health status and health outcomes, such physical community characteristics explained less than 10 percent of the variation between communities with high uninsurance and lower uninsurance in this analysis.

Comparing observed uninsurance with predicted uninsurance based on community characteristics, we identified four types of communities:

- **Entrenched-risk communities:** These communities have high uninsurance and are also predicted to have high uninsurance based on their characteristics. These communities are concentrated in the Greater Boston area and face a variety of challenges, including higher poverty, lower incomes, less educational attainment, and a higher share of households with high housing costs than the rest of the state. These communities have a higher share of the population that is foreign born (and so less likely to be eligible for Medicaid/Children's Health Insurance Program [CHIP]) and a lower share of the population over age 65 (and so less likely to be eligible for Medicare).
- **Unexpected-risk communities:** These communities have high uninsurance but are not predicted to have high uninsurance based on their characteristics. They are primarily found in the touristic areas of the state, including Cape Cod, the islands, and the southern Berkshires. These communities have fewer economic and service resources (e.g., hospitals and other health services, supermarkets and grocery stores, social services,

1 Barnett J and Vornovitsky M. "Health Insurance Coverage in the United States: 2015." Washington, DC: US Government Publishing Office, 2016. Available online at <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-257.pdf>.

2 Long S, Skopec L, Shelto A, Nordahl K, and Kenney Walsh K. Massachusetts Health Reform at Ten Years: Great Progress, but Coverage Gaps Remain. *Health Aff (Millwood)*, 35(9): 1633-1637, 2016.

day care facilities) but higher resources among the population that lives there, including higher incomes and greater social cohesion, than entrenched-risk communities.

- **Resilient communities:** These communities do not have high uninsurance but are predicted to have high uninsurance based on their characteristics. These communities are frequently found adjacent to entrenched-risk communities but have lower shares of the population that were foreign born, higher shares of the population over age 65, and a lower share of households with high housing costs than entrenched-risk communities.
- **Low-risk communities:** These communities do not have high uninsurance and are not predicted to have high uninsurance based on their characteristics. These communities are found throughout the state and tend to have more economic resources and higher social cohesion than the other community types.

The differences between the entrenched-risk and unexpected-risk communities, which both have high uninsurance, point to the potential need for outreach and enrollment strategies designed for two separate types of communities. Specifically, this analysis suggests distinct outreach strategies may be needed for those communities facing the multiple challenges associated with high poverty and those communities with more financial resources but some of whose residents may face more seasonal employment and/or employment in service industries that are less likely to offer employer-sponsored insurance (ESI), resulting in higher-than-expected rates of uninsurance.

INTRODUCTION

Massachusetts had the lowest uninsured rate in the nation in 2015,³ a position it has held since implementation of health reform in 2006.⁴ However, despite the near-universal health insurance coverage that the state has maintained for nearly a decade, pockets of high uninsurance remain for both adults and children in communities across Massachusetts,⁵ raising concerns about access to health care.⁶ In Massachusetts, the uninsured are significantly more likely to report difficulty accessing care and experiencing cost-related barriers to care than those with insurance coverage all year.⁷

Barriers to coverage and barriers to obtaining needed care often reflect both individual-level characteristics (e.g., low income, limited English proficiency, lack of transportation) and community-level characteristics (e.g., limited outreach in languages other than English, limited public transportation). To better understand the geographic and community context of the remaining uninsured in Massachusetts and to provide data for better targeting of outreach and enrollment activities, we explored the relationship between community characteristics and the uninsured rate for people of all ages in Massachusetts communities.

3 Barnett J and Vornovitsky M. "Health Insurance Coverage in the United States: 2015." Washington, DC: US Government Publishing Office, 2016. Available online at <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-257.pdf>.

4 Long S, Skopec L, Shelto A, Nordahl K, and Kenney Walsh K. Massachusetts Health Reform at Ten Years: Great Progress, but Coverage Gaps Remain. *Health Aff (Milwood)*, 35(9): 1633-1637, 2016.

5 Long SK and Dimmock TH. The Geography of Uninsurance in Massachusetts, 2009–2013. Boston, MA: Blue Cross Blue Shield of Massachusetts Foundation, 2015. Available online at <http://bluecrossfoundation.org/publication/geography-uninsurance-massachusetts-2009-2013>.

6 National Center for Health Statistics. "Health Insurance and Access to Care." NCHS Factsheet, November 2012.

7 See, for example, Long S and Dimmock T. "Health Insurance Coverage and Health Care Access and Affordability: Affordability Still a Challenge." Boston, MA: Blue Cross Blue Shield of Massachusetts Foundation, 2014; and Skopec L, Long S, Sherr S, Dutwin D, and Langdale K. "Findings from the 2014 Massachusetts Health Insurance Survey." Boston, MA: Center for Health Information and Analysis, 2015.

BACKGROUND AND METHODS

KEY TERMS

The following key terms are used throughout this policy brief:

- **ZIP Code Tabulation Area (ZCTA):** ZCTAs are geographic areas defined by the Census Bureau that roughly correspond to the areas covered by the U.S. Postal Service ZIP codes. ZCTAs cover nearly all geographic areas in the United States (excluding large bodies of water and some large unpopulated areas) and are the smallest contiguous geographic areas for which all relevant data for this study were available.⁸
- **Community:** For the purposes of this policy brief, a community is a ZCTA, although, as noted in the Data Sources and Measures section below, the ZCTA does not necessarily correspond to actual community boundaries.
- **Characteristics of people in the community:** These are community-level characteristics that reflect the people who live in the community and their households, such as the share of the population under age 18 or the share of housing units that are renter-occupied.
- **Physical characteristics of the community:** These are community-level characteristics that reflect the buildings, infrastructure, and land in the community, such as the distance to the nearest hospital or the share of housing units that are vacant.
- **Service and economic resources in the community:** These include the built environment variables that measure distance to the nearest ZCTA that has particular types of businesses or services, such as hospitals and other health services, food services, social services, and day care facilities. In addition to directly employing individuals, several of these businesses may facilitate employment, such as day care facilities and social service agencies. This set of variables is captured in the category of physical characteristics of the community.
- **Social cohesion:** The level of engagement and cooperation among community residents, as measured by the following: indices of the estimated share of the population voting, volunteering, and participating in public activities in the past 12 months; the share of the population that moved in the past 12 months; and the estimated personal and property crime index. This set of variables is captured primarily in the category of characteristics of people in the community, with the exception of the property crime index.
- **High-uninsurance community:** These communities had average uninsurance at or above the 90th percentile of community uninsurance in Massachusetts, which was 6.6 percent over the 2010–2014 period.
- **Entrenched-risk communities:** These communities have high uninsurance and are predicted to have high uninsurance based on their characteristics.
- **Unexpected-risk communities:** These communities have high uninsurance but are not predicted to have high uninsurance based on their characteristics.
- **Resilient communities:** These communities do not have high uninsurance but are predicted to have high uninsurance based on their characteristics.
- **Low-risk communities:** These communities do not have high uninsurance and are not predicted to have high uninsurance based on their characteristics.

⁸ ACS data are also available at the levels of Census Tracts and Census Block Groups, most of which are smaller than ZCTAs. However, ZIP Code Business Patterns data, which include locations of key establishments like hospitals and physician offices, are available only at the ZCTA level.

DATA SOURCES AND MEASURES

We relied on the combined 2010–2014 ACS data for our measure of community uninsurance. These ACS data are reported based on five-year averages to insure adequate sample sizes to support small area estimates, where ZCTAs are the geographic units that come closest to capturing local communities. There are 32,989 ZCTAs in the United States, 537 of which are in Massachusetts.⁹ Unfortunately, the size of ZCTAs varies greatly, particularly between urban and rural areas, reflecting differences in mail delivery patterns rather than community boundaries. In particular, ZCTAs within urban areas of Massachusetts, at an average of 11 square miles, tend to be far smaller than ZCTAs in rural areas of Massachusetts, at an average of 22 square miles. While we do control for ZCTA size and urban/suburban/rural location in our analysis, the mismatch between ZCTAs and community boundaries is a limitation of our study.

According to the combined 2010–2014 ACS data, the average uninsured rate for all persons in Massachusetts communities ranged from no measured uninsurance to a high of 18.8 percent. For this analysis, we defined high-uninsurance communities as communities with uninsurance at or above the 90th percentile for Massachusetts, which is an uninsured rate of 6.6 percent or more.

This analysis examines the link between high uninsurance in a community and other characteristics of the community. The community characteristics included in the analysis were identified in consultation with an advisory group, resulting in 54 variables across six domains. Those domains were: demographic and socioeconomic characteristics, social cohesion,¹⁰ housing resources, built environment, health system resources, and geography (e.g., state of residence and urban/suburban/rural location). In constructing the measures, we used data from a variety of public sources, including the Census Bureau's ACS and ZIP Code Business Patterns; the U.S. Department of Health and Human Services' Area Health Resources File; and data purchased from private companies like Esri and SpatialInsights. We limited the variables used in the analysis to those that were measured at the ZCTA level and those that were measured consistently across communities. The full set of measures and their data sources are provided in Technical Appendix Table 1. We grouped the measures into two categories for the analysis: characteristics of the population in the communities (e.g., demographic and socioeconomic characteristics, social cohesion with the exception of the property crime index, and housing resources with the exception of vacancy rates) and physical characteristics of the communities (e.g., built environment, health system resources, and urbanicity).

METHODS

To estimate the association between community characteristics and community uninsurance, we conducted both descriptive and multivariate analyses. The descriptive work included:

1. Mapping community uninsurance in Massachusetts to look for geographic clustering of communities with high or low uninsurance; and
2. Examining the correlation between the community uninsured rate and each of the characteristics of people in the community and physical characteristics of the community.

⁹ Six of the 537 ZCTAs were dropped from the analysis because they represented a single business or building or covered large unpopulated areas or bodies of water. The Technical Appendix provides additional information on ZCTAs.

¹⁰ Our measures of social cohesion include: indices of the estimated share of the population voting, volunteering, and participating in public activities in the past 12 months; the share of the population that moved in the past 12 months; and the estimated personal and property crime index. The voting, volunteering, and public activity indices were developed by Esri and are estimates based on the characteristics of the population across 67 dimensions. The personal and property crime indices were developed by SpatialInsights based on several years of city and county crime data, standardized to be comparable across the country.

The multivariate analysis used boosted regression, a machine-learning technique, to search for the best predictive model of being a high-uninsurance community based on community characteristics.^{11,12} The output from the boosted regression analysis is a set of “influence scores,” which are estimates of the importance of each community-level variable in predicting being a high-uninsurance community.¹³ Across all variables included in the model, influence scores sum to 100 percent. In presenting the results, we focus on those measures with influence scores of 1 percent or greater.

We ran the boosted regression models on the entire U.S. dataset,¹⁴ including state-level indicator variables to allow for differences between Massachusetts and other states. Since our boosted regression model allowed interactions among variables,¹⁵ relationships between each variable and the uninsured rate were able to vary by state, allowing the model to capture any relationships unique to Massachusetts or other states (e.g., differences due to state policy). Sensitivity tests conducted using other model specifications are described in the Technical Appendix.

The estimates from the boosted regression models were used to predict whether each community in Massachusetts had high uninsurance based on its characteristics. We compared these predictions with the actual uninsured rate in each community to identify four types of communities: entrenched-risk communities, unexpected-risk communities, resilient communities, and low-risk communities.

11 Schonlau M. Boosted Regression (Boosting): An Introductory Tutorial and a Stata Plugin. *The Stata Journal*, 5(3): 330-354, 2005. Available online at <http://www.stata-journal.com/sjpdf.html?articlenum=st0087>.

12 As an alternative to boosted regression, we estimated regression models for Massachusetts that used summary factors derived from factor analysis for the community measures in Table 1. As the explanatory power of the models from that analysis were much weaker than that of the boosted regression models, we summarize those analyses in the Technical Appendix.

13 The influence scores provide a measure of the strength of the relationship between a variable and the uninsured rate, given all other variables in the model.

14 In estimating the boosted regression models, we used 80 percent of the data to fit the model and the remaining 20 percent of the data to test the model's predictive power. We estimated logit regression models to account for the binary nature of the outcome (high-uninsurance or not high-uninsurance community).

15 This means that boosted regression tested the independent variables both alone and in combination with each other when finding the best-fitting model. We limited the model to two-way interactions, meaning combinations of no more than two variables, as three-way interactions did not provide any additional predictive accuracy.

KEY FINDINGS

Uninsurance varies across Massachusetts communities, with high-uninsurance communities found primarily in Boston, Cape Cod, the islands, and the western part of the state.

The average uninsured rate across Massachusetts communities was 3.4 percent over the 2010–2014 period, with no measured uninsurance in some communities and a high of 18.8 percent uninsured in others. Figures 1 and 2 show the variation in uninsured rates across communities in Massachusetts statewide and in the Greater Boston area, respectively. Communities with high uninsurance were spread across the state over the 2010–2014 period, with concentrations in parts of Boston, Cape Cod, the islands, and the southern Berkshires. Communities with very low uninsurance were also spread throughout the state, including a concentrated ring around Boston.

Many community characteristics are correlated with the uninsured rate, with more-disadvantaged communities more likely to have higher levels of uninsurance.

Nearly all of the characteristics of people in the community had a statistically significant correlation with the uninsured rate. Some characteristics, such as the share of the population below the poverty line or the share of the population that is Hispanic or not white, were highly positively correlated with the uninsured rate, meaning increases in those variables were associated with increases in the uninsured rate. Other characteristics, including the share of adults with some college education or more and the average per capita income in a community, were highly negatively associated with the uninsured rate, meaning an increase in those variables was associated with a decrease in the uninsured rate. In general, communities with higher poverty, lower incomes, larger minority populations, lower educational attainment, higher crime, and lower social cohesion had higher uninsurance in Massachusetts. A table showing the correlation coefficients for each variable is available in the Technical Appendix (Table 2).

Low incomes and poverty are the strongest predictors of high uninsurance in a community, highlighting the overlapping needs in at-risk communities.

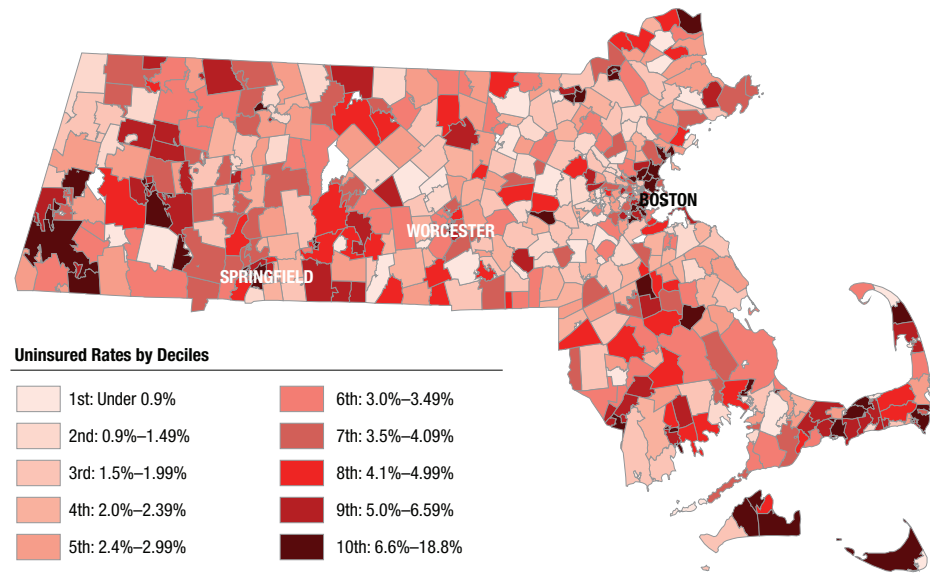
As shown in Table 1, taken together, the share of the population below the poverty line and the share of households with incomes less than \$75,000 accounted for 37.4 percent of the explained variation in uninsured rates across communities. However, poverty and income are highly correlated with many other characteristics of people in the community,¹⁶ so those variables capture many associated hardships that face low-income communities, including, for example, lower employment and more low-wage employment, lower educational attainment, and competing needs, including housing. Taken together, the variables representing the characteristics of people in the community accounted for 85.3 percent of the explained variation between higher and lower uninsured communities, while the physical characteristics of the community accounted for just 7.7 percent. Fixed differences across states accounted for the remaining 7.0 percent of the explained variation in communities.¹⁷ However, we note that the model overall explained 42.7 percent of the variation between communities with higher and lower uninsur-

¹⁶ Correlation coefficients between all variables and the share of the population below the poverty line are shown in Technical Appendix Table 3.

¹⁷ Overall, the state indicator variables accounted for 7.0 percent of the explained variation between high and lower uninsurance communities. This indicates that state-level factors not otherwise captured in the characteristics of people in the community or physical characteristics of the community, such as state policy, also have some effect on uninsured rates.

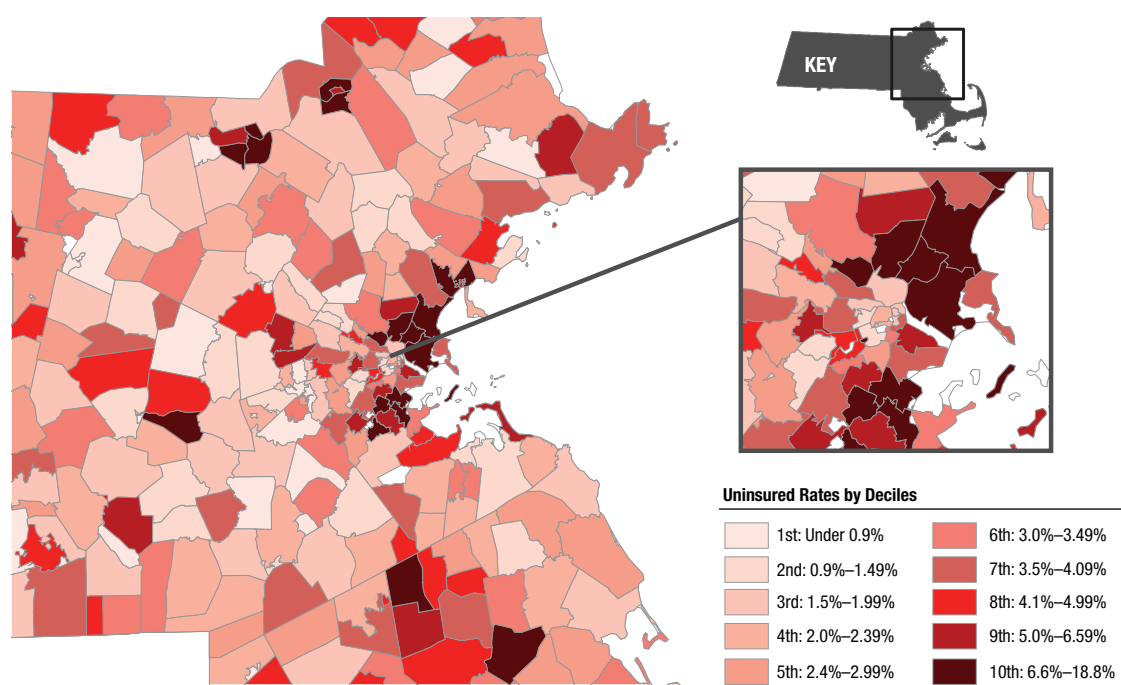
ance, so over half of the variation was not explained by the variables included in our model.¹⁸ This likely reflects, in part, differences across communities in characteristics that were not included in our model, such as availability of ESI, variation in insurance take-up rates, and differences in eligibility due to immigration status, for example.

FIGURE 1: UNINSURED RATES IN MASSACHUSETTS BY COMMUNITY, 2010–2014 AVERAGE



Note: Areas in white are unpopulated or are missing poverty or uninsurance data in the 2010–2014 ACS.

FIGURE 2: UNINSURED RATES IN THE GREATER BOSTON AREA BY COMMUNITY, 2010–2014 AVERAGE



Note: Areas in white are unpopulated or are missing poverty or uninsurance data in the 2010–2014 ACS.

18 This figure is the adjusted R^2 for the test data based on a split-sample analysis that estimated the model on 80 percent of the sample and tested the model on the remaining 20 percent of the sample. In the social sciences, an R^2 over 40 percent for a cross-sectional analysis is generally quite high, reflecting strong predictive power in the model.

TABLE 1: INFLUENCE OF COMMUNITY CHARACTERISTICS ON COMMUNITY UNINSURANCE IN MASSACHUSETTS, RESULTS FROM BOOSTED REGRESSION

	Influence score (%) from boosted regression		Influence score (%) from boosted regression
CHARACTERISTICS OF PEOPLE IN THE COMMUNITY		PHYSICAL CHARACTERISTICS OF THE COMMUNITY	
Share of the population under age 18	<1.0	Housing unit vacancy rate	1.5
Share of the population over age 65	2.0	Index of property crime rate**	<1.0
Share of the population that is male	1.1	Distance to nearest ZCTA with a supermarket or grocery store	<1.0
Share of the population that is Hispanic or not white	3.2	Distance to nearest ZCTA with a limited-service restaurant	<1.0
Share of the population over age 25 that is married	1.5	Distance to nearest ZCTA with a liquor store	<1.0
Share of the population that is foreign-born	<1.0	Distance to nearest ZCTA with a bar or drinking place	<1.0
Share of the population over age 25 with at least some college education	2.1	Distance to nearest ZCTA with fitness, recreation, or sporting facilities	<1.0
Share of the population over age 25 that is working	1.3	Distance to nearest ZCTA with an elementary school	<1.0
Share of the population with income below the poverty line	15.6	Distance to nearest ZCTA with a child-care facility	<1.0
Per-capita income	1.6	Distance to nearest ZCTA with social services establishments	<1.0
Share of households with income less than \$10,000	<1.0	Distance to nearest ZCTA with a pharmacy or drugstore	<1.0
Share of households with income less than \$15,000	<1.0	Distance to nearest ZCTA with a religious building	<1.0
Share of households with income less than \$25,000	<1.0	Distance to nearest ZCTA with arts and entertainment facilities	<1.0
Share of households with income less than \$35,000	1.0	Distance to nearest ZCTA with a hospital	<1.0
Share of households with income less than \$50,000	2.1	Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	<1.0
Share of households with income less than \$75,000	21.7	Distance to nearest ZCTA with a mental health or substance use disorder facility	<1.0
Share of households with income less than \$100,000	15.3	Distance to nearest ZCTA with a physician's office	<1.0
Share of households with income less than \$150,000	<1.0	Distance to nearest ZCTA with a mental health practitioner's office	<1.0
Share of households that are family households*	<1.0	Distance to nearest ZCTA with a dentist's office	<1.0
Share of family households with a female head of household	1.6	Rural-urban continuum code	<1.0
Share of units that are renter-occupied	1.6	Land area (square miles)	1.3
Share of rented units with rent more than 30 percent of household income	<1.0	Population density (persons per square mile)	<1.0
Share of owned units with mortgage more than 30 percent of household income	<1.0	Total, physical characteristics of the community	7.7
Index of personal crime rate**	2.0	STATE-LEVEL FACTORS	
Index of share of population volunteering in past 12 months**	<1.0	Massachusetts	2.8
Index of share participating in a public activity in past 12 months**	<1.0	Total, state-level factors	7.0
Index of estimated share of population voting in past 12 months**	<1.0		
Share of the population over age 1 that moved in the past year	1.3		
Share of workers employed in manufacturing	<1.0		
Share of workers employed in retail trade	1.0		
Share of workers employed in health or social services	<1.0		
Share of workers employed in accommodation or food service	<1.0		
Total, characteristics of people in the community	85.3		

Source: Analyses based on 32,403 ZCTAs in the United States.

Notes: Boosted regression allowing two-way interactions. Test R² was 42.7 percent.

*A family household is any household in which the householder is related to any other household members, including by marriage.

**All indices are based on comparison with the national average, which is set to a value of 100.

Four types of communities can be identified based on their risk of having high uninsurance: entrenched-risk communities, unexpected-risk communities, resilient communities, and low-risk communities.

Figures 3 and 4 and Technical Appendix Table 4 show the four types of communities in Massachusetts by observed and predicted high uninsurance. Entrenched-risk communities, which are those with high uninsurance that were predicted to have high uninsurance based on their characteristics, face a variety of challenges compared with other communities in Massachusetts.¹⁹ For example, entrenched-risk communities have a higher share of the population that is foreign born (and so less likely to be eligible for Medicaid/CHIP) and a lower share of the population over age 65 (and so less likely to be eligible for Medicare), as well as greater economic challenges (e.g., a higher share of female-headed households, a higher share of households with high housing costs). Many of the entrenched-risk communities are in the Boston area, with only a few in the western half of the state.²⁰ Entrenched-risk communities account for 30 of the 53 communities with high uninsurance in Massachusetts.

Unexpected-risk communities, which are communities that had high uninsurance but were not predicted to have high uninsurance based on their characteristics, tend to be located in areas that rely heavily on tourism and seasonal employment, including Cape Cod, the islands, and the southern Berkshires.²¹ These areas tend to be rural or lower-population urban areas with fewer economic and service resources in the community (e.g., hospitals and other health services, food services, social services, day care facilities) but higher resources among the population that lives there, including higher income and greater social cohesion. However, given the seasonal nature of the economy in many of these areas and the greater focus on employment in service industries to support tourism, the higher-than-expected levels of uninsurance may be related to lower availability of ESI, which we do not measure in this study. There were 23 unexpected-risk communities in Massachusetts, out of a total of 53 high-uninsurance communities.

In contrast, resilient communities, which are communities that were predicted to have high uninsurance based on their characteristics but did not, are concentrated in moderately urban areas and suburban areas such as Worcester, north of Springfield, and north and south of Boston.²² They are also frequently adjacent to entrenched-risk communities, reflecting their economic similarity on many dimensions. However, compared with entrenched-risk communities, resilient communities have a smaller share of the population that was foreign born and a larger share of the population over age 65 (which would suggest greater eligibility for Medicaid and Medicare), as well as fewer financial challenges (e.g., a smaller share of households with high housing costs). There are 23 resilient communities in Massachusetts, out of a total of 478 communities with uninsured rates less than 6.6 percent.

Finally, low-risk communities, which are communities that do not have high uninsurance and were not predicted to have high uninsurance based on their characteristics, represent 455 of the 531 communities in the state and are spread across all areas of the state.²³ Not surprisingly, the population in these areas tends to have much greater economic resources and social cohesion.

¹⁹ Entrenched-risk communities have an average uninsured rate of 8.5 percent, with a range of 6.6 to 13.6 percent.

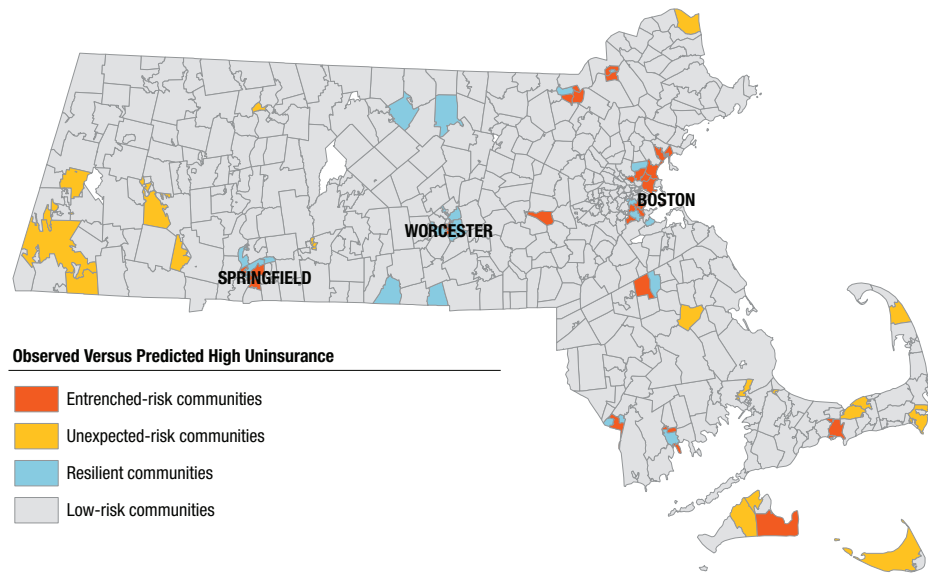
²⁰ No entrenched-risk communities were found west of Springfield.

²¹ Unexpected-risk communities have an average uninsured rate of 9.3 percent, with a range from 6.6 to 18.8 percent.

²² Resilient communities have an average uninsured rate of 4.8 percent, with a range from 3.2 to 6.3 percent.

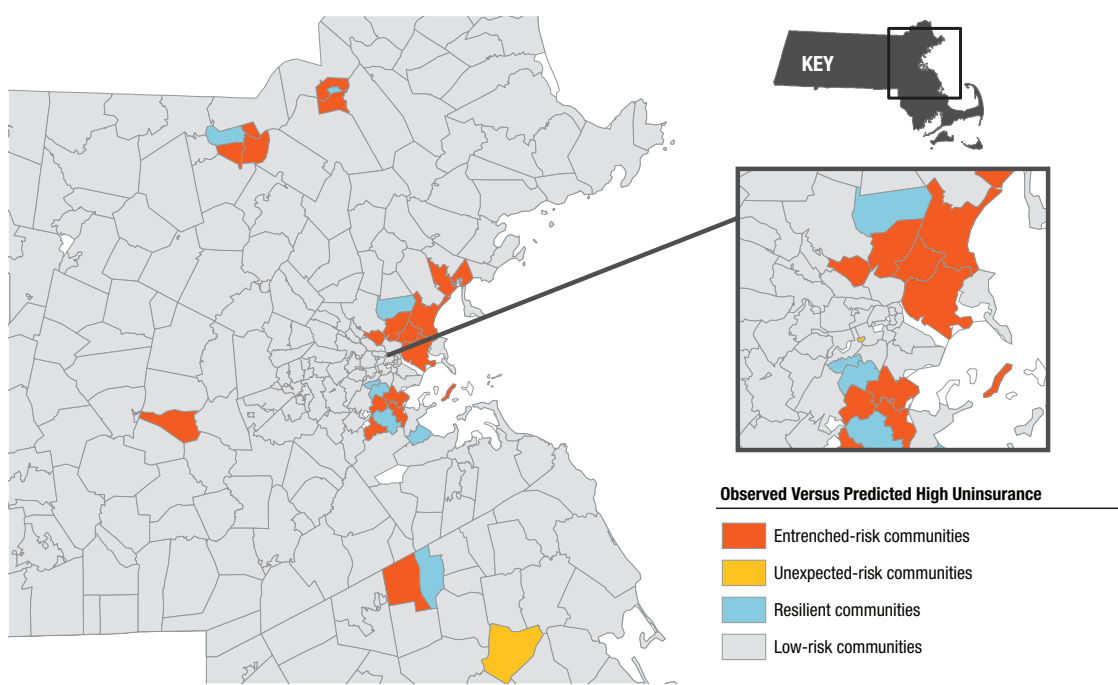
²³ Low-risk communities have an average uninsured rate of 2.7 percent, with a range from 0.0 to 6.5 percent.

FIGURE 3: OBSERVED VERSUS PREDICTED HIGH UNINSURANCE FOR COMMUNITIES IN MASSACHUSETTS



Note: Areas in white are unpopulated or are missing poverty or uninsurance data in the 2010–2014 ACS.

FIGURE 4: OBSERVED VERSUS PREDICTED HIGH UNINSURANCE FOR COMMUNITIES IN THE GREATER BOSTON AREA



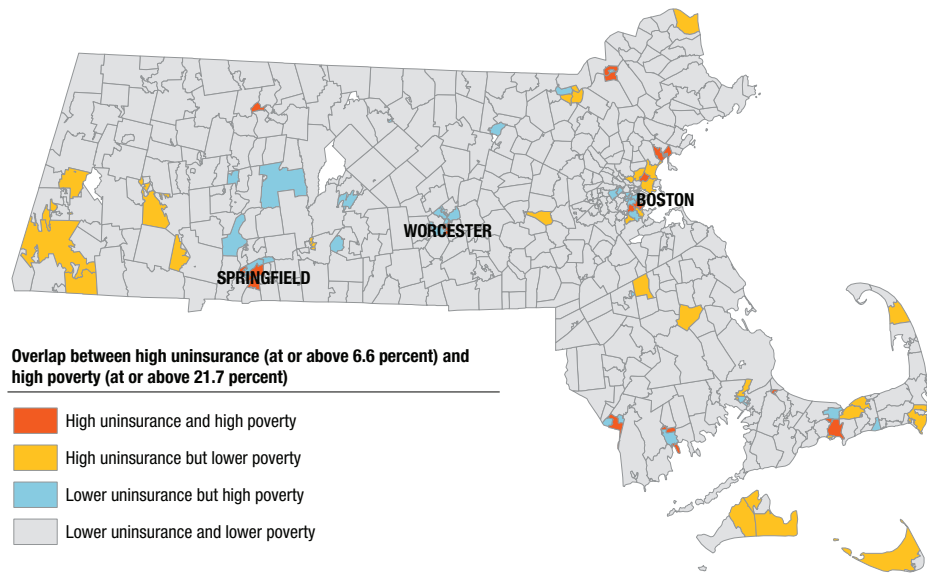
Note: Areas in white are unpopulated or are missing poverty or uninsurance data in the 2010–2014 ACS.

Targeting communities with high uninsurance and high poverty would reach many entrenched-risk communities but few of the unexpected-risk communities.

Figures 5 and 6 and Technical Appendix Table 5 show the overlap between high-uninsurance and high-poverty communities in Massachusetts. Communities with both high uninsurance and high poverty tend to be concentrated in the Greater Boston area, southern Springfield, and in the southeastern areas of the state. Overall, while poverty and income are strong predictors of high community uninsurance, a high poverty rate alone does not necessarily signal a high-uninsurance community. About half of the entrenched-risk communities are also high-poverty communities, while fewer than 10 percent of the unexpected-risk communities are also high-poverty communities (Technical Appendix Table 5). Targeting high-poverty communities for outreach and enrollment efforts would therefore not capture all high-uninsurance communities, but it would capture many of the most disadvantaged communities. Those communities with both a high poverty rate and high uninsurance face many disadvantages compared with other areas of Massachusetts, including, for example, lower educational attainment and less social cohesion. In addition, communities with high poverty and high uninsurance have more racial and ethnic minorities than other Massachusetts communities. However, targeting high-poverty communities would also capture over half of the resilient communities in the state, which, although they too have many disadvantages, do not have high uninsurance.

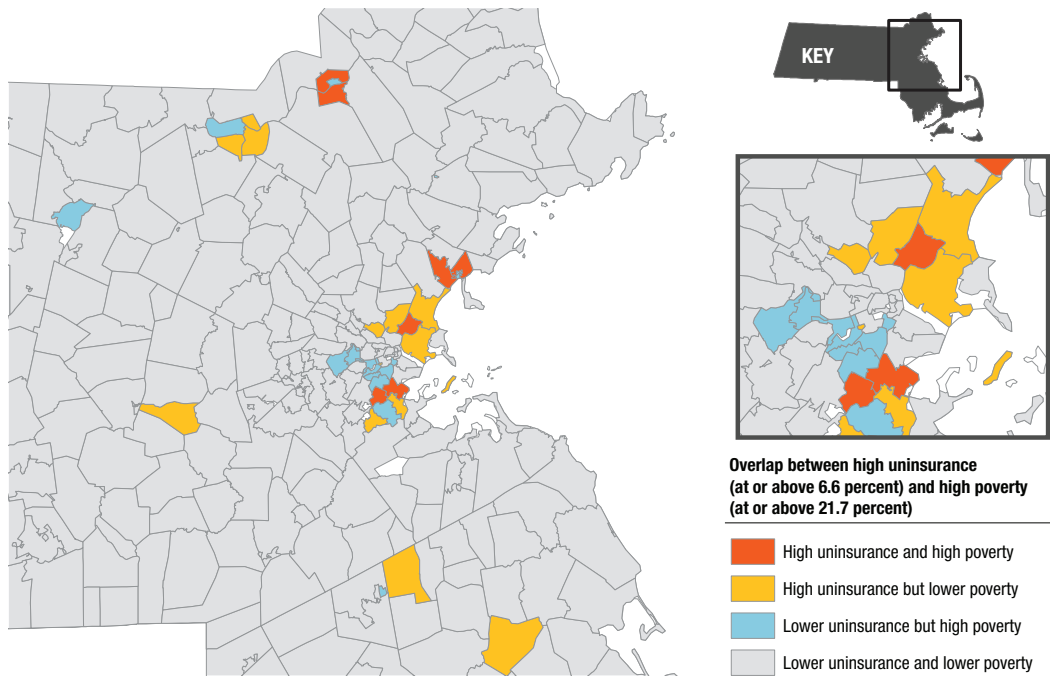
The communities with high uninsurance but lower poverty were more likely to be unexpected-risk communities, which were concentrated in high-tourism areas such as Cape Cod, the islands, and the southern end of the Berkshires. These communities cannot be identified based on low incomes or poverty levels alone, and they differ from the high-uninsured and high-poverty communities across more than three-quarters of our measures of community characteristics, including physical characteristics and characteristics of the population, such as educational attainment, share of the population foreign born, share of the population working, share of family households with a female head, and share of the population that is Hispanic or not white. Given these differences in the characteristics of the populations in high-uninsurance communities with and without high poverty, different outreach and enrollment strategies will likely be required to reduce uninsurance in these areas.

FIGURE 5: HIGH UNINSURANCE AND HIGH POVERTY FOR COMMUNITIES IN MASSACHUSETTS



Note: Areas in white are unpopulated or are missing poverty or uninsured data in the 2010–2014 ACS.

FIGURE 6: HIGH UNINSURANCE AND HIGH POVERTY FOR COMMUNITIES IN THE GREATER BOSTON AREA



Note: Areas in white are unpopulated or are missing poverty or uninsured data in the 2010–2014 ACS.

IMPLICATIONS

High-uninsurance communities in Massachusetts are heterogeneous.

Given that the uninsured rate in high-uninsurance communities in Massachusetts ranges from 6.6 to 18.8 percent, it is not necessarily surprising that there is no common set of characteristics that identifies high-uninsurance communities in the state. While income and poverty are important predictors of uninsurance, Massachusetts has both high- and lower-poverty communities with high uninsured rates. In addition, these communities span urban, suburban, and rural areas across the state. In general, though, our findings point to two broad types of high-uninsurance communities: those in urban and suburban areas with high poverty (entrenched-risk communities), and those in more rural areas of the state that are not high-poverty but depend heavily on seasonal employment and tourism (unexpected-risk communities).

Many entrenched-risk communities in Massachusetts face multiple challenges, particularly high poverty and associated burdens.

High-uninsurance communities in Massachusetts, on average, have higher poverty rates and lower per capita and household incomes than lower-uninsurance areas. Poverty is closely correlated with many factors other than income that could also affect health insurance coverage rates, including lower employment and more low-wage employment, low educational attainment, and competing needs, including housing.

Unexpected-risk communities face fewer overt challenges but may be burdened in ways not captured in this analysis.

The unexpected-risk communities, which have higher-than-expected uninsurance based on their characteristics, tend to be located in touristic areas of the state including Cape Cod, the islands, and the southern Berkshires. These communities have higher incomes, fewer minorities and foreign-born residents, and more-educated residents than many other areas of the state but may also have less access to ESI in the tourism industry and among seasonal workers. Therefore, outreach to these communities may need to differ from outreach designed for communities facing the multiple challenges associated with high poverty.

Resilient communities are frequently physically close to entrenched-risk communities but have some advantages.

Resilient communities, which have lower-than-expected uninsurance based on their characteristics, are frequently adjacent to entrenched-risk communities. However, compared with entrenched-risk communities, resilient communities have a smaller share of the population that was foreign born and a larger share of the population over age 65, which may suggest greater eligibility for Medicare and Medicaid. In addition, resilient communities, on average, appear to face fewer financial challenges (e.g., a smaller share of households with high housing costs).

Multiple outreach efforts are needed to reach high-uninsurance communities.

Outreach efforts will need to take into account that the entrenched-risk communities face a variety of challenges beyond health insurance coverage, including a lack of economic resources and social cohesion and greater financial needs. To reach the uninsured in these communities, joint efforts with community-based organizations with ties to at-risk populations in the community may be beneficial. Even within these communities, there will be need for different types of outreach, including outreach in non-English languages, outreach targeted to low-literacy/low-numeracy adults, and work-related outreach.

LIMITATIONS AND OPPORTUNITIES

This analysis has several limitations and also points to several promising areas for future research. First, although our analysis explores associations between community characteristics and community uninsurance in Massachusetts, it cannot address causality. In addition, we define communities as ZCTAs, which do not necessarily reflect actual community boundaries. And our definition of high-uninsurance communities—those at the 90th percentile or higher for uninsurance statewide—captures a heterogeneous range of communities with uninsured rates from 6.6 to 18.8 percent. Finally, while we focus on 54 measures of population and physical characteristics of the communities, we likely miss some important variables that could be strong predictors of different types of high-uninsurance communities.

Future work should expand the set of measures to better describe the resilient communities that have lower uninsurance than expected based on their observed characteristics, and unexpected-risk communities that have higher uninsurance than expected based on their characteristics. Given the location and characteristics of unexpected-risk communities, we hypothesize that there would be value in adding variables that measure seasonal employment, self-employment, and offers of ESI to the analysis, while the location and characteristics of resilient communities suggest a need to add more variables measuring citizenship, state policy variables such as Medicaid eligibility, and cost-of-living measures. Deeper investigation, including qualitative work, into resilient and unexpected-risk communities would also help to illuminate additional reasons for unexpectedly low and unexpectedly high uninsurance to guide future work. Finally, further narrowing of the definition of high uninsurance, perhaps to just those communities with double-digit uninsured rates, could illuminate more common factors associated with very high uninsurance across communities.

TECHNICAL APPENDIX

This Technical Appendix provides more details on the data and methods used for the study, including the following:

- Data sources
- Using ZCTAs to define Massachusetts communities
- Boosted regression analyses

DATA SOURCES

Appendix Table 1 list the variables used for the study and their sources, by domain. Appendix Table 2 shows the correlations between each variable and the share of the community's population that is uninsured. Appendix Table 3 shows the correlations between each variable and the share of the population with income below the poverty line.

While most of the data used in this analysis are publicly available, including all data from the 2010–2014 American Community Survey, ZIP Code Business Patterns, and the U.S. Department of Health and Human Services' Area Health Resources File, two datasets were purchased from private entities. The voting, volunteering, and public activity indices were developed by Esri and are estimates based on the characteristics of the population across 67 dimensions. The personal and property crime indices were developed by SpatialInsights based on several years of city and county crime data, standardized to be comparable across the country.

In addition, the rural-urban continuum code from the Area Health Resources File was available only at the county level. We applied these data to the ZCTA level using a ZCTA-to-county crosswalk from the Census Bureau. However, we note that Massachusetts has only 14 counties and 537 ZCTAs, six of which were dropped for this analysis as described below, so county-level data does not provide a detailed picture of Massachusetts communities.

USING ZCTAs TO DEFINE MASSACHUSETTS COMMUNITIES

Not all ZCTAs correspond to populated areas. Some ZCTAs represent a single business or building, and some cover large unpopulated areas or bodies of water. In Massachusetts, we dropped six ZCTAs. Three ZCTAs were for facilities and parks, including Boston City Hall, a hospital, and a state forest. In addition, the Census Bureau does not calculate poverty measures for ZCTAs that represent institutionalized persons, those living on military bases, and those living in college dormitories. We dropped three ZCTAs that represent colleges in Massachusetts (Smith College, Babson College, and Westfield State University) and that likely correspond to dorms. Our final Massachusetts dataset included 531 ZCTAs.

Nationally, we dropped a total of 510 ZCTAs (including the six in Massachusetts). For the remaining ZCTAs, missing values for any of the variables were imputed based on the average of the values for all surrounding ZCTAs. After imputation, any ZCTAs for which missing values could not be imputed were dropped from the analysis. This did not result in any dropped ZCTAs in Massachusetts but did result in dropping 77 ZCTAs in the national dataset, most of which were islands or very rural areas. Our final dataset included 32,403 ZCTAs nationally.

BOOSTED REGRESSION ANALYSES

Boosted regression is a machine-learning technique that searches for the best predictive model between the selected dependent and independent variables.²⁴ We conducted several boosted regression analyses for this study.²⁵ In determining the model to present in the policy brief, we balanced predictive power²⁶ and evidence of over-fitting.²⁷ We developed models for the following measures of uninsurance: the community-level uninsurance rate, an indicator for uninsurance at the 80th percentile or above in Massachusetts (5.0 percent), and an indicator for uninsurance at the 90th percentile or above in Massachusetts (6.6 percent). For each of these uninsurance measures, we tested four specifications of the model: (1) all of the community measures from Appendix Table 1; (2) all of the community measures and two-way interactions among those variables; (3) all of the community measures, state indicator variables for all 50 states and the District of Columbia, and two-way interactions of all those variables; and (4) all of the community measures, state indicator variables, and three-way interactions of all of those variables. Overall, the estimates from the boosted regression models with state indicator variables and two-way interactions (specification three above) had the strongest explanatory power and the strongest predictive power without evidence of over-fitting.²⁸

We focused on uninsurance at or above the 90th percentile in Massachusetts because those models had better predictive power than models using the community-level uninsured rate, and because targeting the highest-need communities is a priority in the state. Because of the heterogeneity in high-uninsurance communities in Massachusetts, we tested separate models for urban and rural areas using the appropriate 90th percentile of uninsurance for Massachusetts for each area type and for model specification three above. These models did not significantly improve predictive power, in part because very few communities in Massachusetts are rural. This is in part because the rural-urban continuum code is county-based, and Massachusetts counties cover a large land area, with most including at least part of a metropolitan statistical area.

All boosted regression models identified poverty and income as key influencers of high uninsurance in a community. This was true both in the national models without state-level indicator variables and in the models with those variables, indicating some commonality across states.

All of our boosted regression analyses are intended to be descriptive and are not intended to identify causal relationships between any variables and the uninsured rate in a community. This analysis was designed to provide community-level context for the high-uninsured communities in Massachusetts and help guide outreach and enrollment work, not to address the root causes of uninsurance.

Appendix Table 4 shows a comparison of communities based on their predicted likelihood of being a high-uninsurance community compared with their actual uninsured rate. As described in the policy brief, the following types of communities are compared: entrenched-risk communities, unexpected-risk communities, resilient

24 Schonlau M. Boosted Regression (Boosting): An Introductory Tutorial and a Stata Plugin. *The Stata Journal*; 5(3): 330–354, 2005. Available online at <http://www.stata-journal.com/sjpdf.html?articlenum=st0087>.

25 As part of this study, we also conducted factor analysis, which is a data-reduction technique that attempts to find common factors underlying multiple correlated variables. Regression models based on the factors produced generally similar results to the boosted regression models in terms of the types of variables that were significant, including affluence, urbanicity, and poverty, but the models had lower explanatory power and poorer predictive accuracy.

26 In estimating the boosted regression models, we used 80 percent of the data to fit the model and the remaining 20 percent of the data to test the model's predictive power. We based the selection of the model with the strongest predictive power on the predictive power derived from estimating the model using the 20-percent test sample. We measured predictive power both by the R^2 for the test sample and by the accuracy of predictions derived from the model.

27 Our evidence for over-fitting was little change in R^2 for the test sample between a given model and the previous model, with a moderate or large change in R^2 for the training sample.

28 Model specification four showed evidence of over-fitting. For the model using an indicator for uninsurance at or above the 90th percentile in Massachusetts, the training sample R^2 was 0.89, while the test sample R^2 was 0.43. For comparison, model specification three, which was ultimately used in the policy brief, also had a test sample R^2 of 0.43 but had a training sample R^2 of 0.66.

communities, and low-risk communities. Appendix Table 5 shows a comparison of communities based on a combination of their uninsurance and poverty rates, grouping communities into categories for high uninsurance and high poverty, high uninsurance and lower poverty, lower uninsurance and high poverty, and lower uninsurance and lower poverty.

TECHNICAL APPENDIX TABLE 1: COMMUNITY DATA AND DATA SOURCES, BY DOMAIN

DOMAIN	VARIABLE	SOURCE
DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS	Share of the population under age 18	ACS
	Share of the population aged 65 and older	ACS
	Share of the population that is male	ACS
	Share of the population that is Hispanic or not white	ACS
	Share of the population over age 25 that is married	ACS
	Share of the population that is foreign born	ACS
	Share of the population over age 25 with at least some college education	ACS
	Share of the population over age 25 that is working	ACS
	Share of the population with income below the poverty line	ACS
	Per capita income	ACS
	Share of households with income less than \$10,000	ACS
	Share of households with income less than \$15,000	ACS
	Share of households with income less than \$25,000	ACS
	Share of households with income less than \$35,000	ACS
	Share of households with income less than \$50,000	ACS
	Share of households with income less than \$75,000	ACS
	Share of households with income less than \$100,000	ACS
	Share of households with income less than \$150,000	ACS
	Share of households that are family households*	ACS
	Share of family households with a female head of household	ACS
	Share of workers employed in manufacturing	ACS
	Share of workers employed in retail trade	ACS
	Share of workers employed in health or social services	ACS
	Share of workers employed in accommodation or food service	ACS
SOCIAL COHESION	Index of personal crime rate**	SpatialInsights
	Index of property crime rate**	SpatialInsights
	Index of share of population volunteering in past 12 months**	Esri
	Index of share participating in a public activity in past 12 months**	Esri
	Index of share of population voting in past 12 months**	Esri
	Share of the population over age 1 that moved in the past year	ACS
HOUSING RESOURCES	Share of units that are renter-occupied	ACS
	Share of rented units with rent more than 30 percent of household income	ACS
	Share of owned units with mortgage more than 30 percent of household income	ACS
	Housing unit vacancy rate	ACS

continued

continued

DOMAIN	VARIABLE	SOURCE
BUILT ENVIRONMENT	Distance to nearest ZCTA with a supermarket or grocery store	ZBP
	Distance to nearest ZCTA with a limited-service restaurant	ZBP
	Distance to nearest ZCTA with a beer, wine, or liquor store	ZBP
	Distance to nearest ZCTA with a bar or drinking place	ZBP
	Distance to nearest ZCTA with fitness, recreation, or sporting facilities	ZBP
	Distance to nearest ZCTA with an elementary school	ZBP
	Distance to nearest ZCTA with a child-care facility	ZBP
	Distance to nearest ZCTA with social services establishments	ZBP
	Distance to nearest ZCTA with a religious building	ZBP
	Distance to nearest ZCTA with arts and entertainment facilities	ZBP
HEALTH SYSTEM RESOURCES	Distance to nearest ZCTA with a hospital	ZBP
	Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	ZBP
	Distance to nearest ZCTA with a mental health or substance use facility	ZBP
	Distance to nearest ZCTA with a physician's office	ZBP
	Distance to nearest ZCTA with a mental health practitioner's office	ZBP
	Distance to nearest ZCTA with a dentist's office	ZBP
	Distance to nearest ZCTA with a pharmacy or drugstore	ZBP
URBANICITY	Rural-urban continuum code	AHRF
	Land area (square miles)	ACS and Census TigerFiles
	Population density (persons per square mile)	ACS and Census TigerFiles

Sources: Census Bureau (ACS, ZBP, Census TigerFiles); U.S. Department of Health and Human Services (AHRF); SpatialInsights, Esri.

Notes: ACS is American Community Survey; AHRF is Area Health Resources File, and ZBP is Zip Code Business Patterns.

* A family household is any household in which the householder is related to any other household members, including by marriage.

** All indices are based on comparison with the national average, which is set to a value of 100.

TECHNICAL APPENDIX TABLE 2: CORRELATION COEFFICIENTS BETWEEN COMMUNITY CHARACTERISTICS AND THE COMMUNITY UNINSURED RATE IN MASSACHUSETTS

	CORRELATION COEFFICIENT
CHARACTERISTICS OF PEOPLE IN THE COMMUNITY	
Share of the population under age 18	0.00
Share of the population over age 65	-0.12 †
Share of the population that is male	0.05
Share of the population that is Hispanic or not white	0.32 †
Share of the population over age 25 that is married	-0.32 †
Share of the population that is foreign born	0.24 †
Share of the population over age 25 with at least some college education	-0.45 †
Share of the population over age 25 that is working	-0.09 †
Share of the population with income below the poverty line	0.39 †
Per-capita income	-0.35 †
Share of households with income less than \$10,000	0.38 †
Share of households with income less than \$15,000	0.39 †
Share of households with income less than \$25,000	0.42 †
Share of households with income less than \$35,000	0.40 †
Share of households with income less than \$50,000	0.36 †
Share of households with income less than \$75,000	0.42 †
Share of households with income less than \$100,000	0.43 †
Share of households with income less than \$150,000	0.41 †
Share of households that are family households*	-0.18 †
Share of family households with a female head of household	0.33 †
Share of units that are renter-occupied	0.29 †
Share of rented units with rent more than 30 percent of household income	0.24 †
Share of owned units with mortgage more than 30 percent of household income	0.22 †
Index of personal crime rate**	0.29 †
Index of share of population volunteering in past 12 months**	-0.44 †
Index of share participating in a public activity in past 12 months**	-0.39 †
Index of share of population voting in past 12 months**	-0.38 †
Share of the population over age 1 that moved in the past year	0.06
Share of workers employed in manufacturing	-0.03
Share of workers employed in retail trade	0.15 †
Share of workers employed in health or social services	0.10 †
Share of workers employed in accommodation or food service	0.38 †

continued

continued

CORRELATION COEFFICIENT	
PHYSICAL CHARACTERISTICS OF THE COMMUNITY	
Housing unit vacancy rate	0.10 †
Index of property crime rate**	0.20 †
Distance to nearest ZCTA with a supermarket or grocery store	-0.09 †
Distance to nearest ZCTA with a limited-service restaurant	0.01
Distance to nearest ZCTA with a liquor store	-0.05
Distance to nearest ZCTA with a bar or drinking place	-0.12 †
Distance to nearest ZCTA with fitness, recreation, or sporting facilities	-0.05
Distance to nearest ZCTA with an elementary school	-0.02
Distance to nearest ZCTA with a child-care facility	0.00
Distance to nearest ZCTA with social services establishments	-0.05
Distance to nearest ZCTA with a pharmacy or drugstore	-0.04
Distance to nearest ZCTA with a religious building	-0.03
Distance to nearest ZCTA with arts and entertainment facilities	-0.07
Distance to nearest ZCTA with a hospital	-0.08
Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	-0.19 †
Distance to nearest ZCTA with a mental health or substance use facility	-0.07
Distance to nearest ZCTA with a physician's office	-0.05
Distance to nearest ZCTA with a mental health practitioner's office	0.01
Distance to nearest ZCTA with a dentist's office	-0.01
Rural-urban continuum code	0.09
Land area (square miles)	-0.08
Population density (persons per square mile)	0.13 †

Source: Analysis based on 531 ZCTAs in Massachusetts.

† Correlation coefficient is significantly different from zero at the 0.05 level.

* A family household is any household in which the householder is related to any other household members, including by marriage.

** All indices are based on comparison with the national average, which is set to a value of 100.

TECHNICAL APPENDIX TABLE 3: CORRELATION COEFFICIENTS BETWEEN COMMUNITY CHARACTERISTICS AND THE SHARE OF THE POPULATION WITH INCOME BELOW THE POVERTY LINE IN MASSACHUSETTS

	CORRELATION COEFFICIENT
CHARACTERISTICS OF PEOPLE IN THE COMMUNITY	
Share of the population under age 18	-0.12 †
Share of the population over age 65	-0.17 †
Share of the population that is male	0.20 †
Share of the population that is Hispanic or not white	0.60 †
Share of the population over age 25 that is married	-0.60 †
Share of the population that is foreign born	0.35 †
Share of the population over age 25 with at least some college education	-0.35 †
Share of the population over age 25 that is working	-0.42 †
Per capita income	-0.42 †
Share of households with income less than \$10,000	0.75 †
Share of households with income less than \$15,000	0.75 †
Share of households with income less than \$25,000	0.70 †
Share of households with income less than \$35,000	0.64 †
Share of households with income less than \$50,000	0.55 †
Share of households with income less than \$75,000	0.52 †
Share of households with income less than \$100,000	0.46 †
Share of households with income less than \$150,000	0.37 †
Share of households that are family households*	-0.36 †
Share of family households with a female head of household	0.49 †
Share of units that are renter-occupied	0.56 †
Share of rented units with rent more than 30 percent of household income	0.27 †
Share of owned units with mortgage more than 30 percent of household income	0.17 †
Index of personal crime rate**	0.49 †
Index of share of population volunteering in past 12 months**	-0.50 †
Index of share participating in a public activity in past 12 months**	-0.48 †
Index of share of population voting in past 12 months**	-0.50 †
Share of the population over age 1 that moved in the past year	0.42 †
Share of workers employed in manufacturing	-0.07
Share of workers employed in retail trade	0.12 †
Share of workers employed in health or social services	0.15 †
Share of workers employed in accommodation or food service	0.35 †

continued

continued

	CORRELATION COEFFICIENT
PHYSICAL CHARACTERISTICS OF THE COMMUNITY	
Housing unit vacancy rate	0.00
Index of property crime rate**	0.37 †
Distance to nearest ZCTA with a supermarket or grocery store	-0.14 †
Distance to nearest ZCTA with a limited-service restaurant	-0.10 †
Distance to nearest ZCTA with a liquor store	-0.10 †
Distance to nearest ZCTA with a bar or drinking place	-0.27 †
Distance to nearest ZCTA with fitness, recreation, or sporting facilities	-0.11 †
Distance to nearest ZCTA with an elementary school	-0.13 †
Distance to nearest ZCTA with a child-care facility	-0.06
Distance to nearest ZCTA with social services establishments	-0.16 †
Distance to nearest ZCTA with a pharmacy or drugstore	-0.13 †
Distance to nearest ZCTA with a religious building	-0.02
Distance to nearest ZCTA with arts and entertainment facilities	-0.14 †
Distance to nearest ZCTA with a hospital	-0.25 †
Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	-0.31 †
Distance to nearest ZCTA with a mental health or substance use facility	-0.24 †
Distance to nearest ZCTA with a physician's office	-0.09 †
Distance to nearest ZCTA with a mental health practitioner's office	-0.13 †
Distance to nearest ZCTA with a dentist's office	-0.08
Rural-urban continuum code	-0.02
Land area (square miles)	-0.21 †
Population density (persons per square mile)	0.38 †

Source: Analysis based on 531 ZCTAs in Massachusetts.

† Correlation coefficient is significantly different from zero at the 0.05 level.

* A family household is any household in which the householder is related to any other household members, including by marriage.

** All indices are based on comparison with the national average, which is set to a value of 100.

TECHNICAL APPENDIX TABLE 4: CHARACTERISTICS OF MASSACHUSETTS COMMUNITIES, BY OBSERVED AND PREDICTED HIGH UNINSURANCE

	COMMUNITY TYPE				
	ENTRENCHED RISK	UNEXPECTED RISK	RESILIENT	LOW RISK	
	High uninsured and predicted high uninsured	High uninsured but not predicted high uninsured	Relatively low uninsured but predicted high uninsured	Relatively low uninsured and not predicted high uninsured	
Average uninsurance nationally	16.2%	12.4%	4.4%	3.0%	
Average uninsurance in Massachusetts	8.5%	9.3%	4.8%	2.7%	
CHARACTERISTICS OF PEOPLE IN THE COMMUNITY					
Share of the population under age 18	24.0%	17.7% ††	22.5% ^^^	19.4% ††	##
Share of the population over age 65	10.1%	20.4% ††	12.9% †† ^^^	17.7% ††	##
Share of the population that is male	47.7%	49.0%	46.6% ^	48.0%	
Share of the population that is Hispanic or not white	52.3%	5.4% ††	42.3% ^^^	10.3% †† ^	###
Share of the population over age 25 that is married	46.2%	57.1% ††	46.9% ^^^	62.3% †† ^	###
Share of the population that is foreign born	27.5%	5.6% ††	20.0% † ^^^	8.9% †† ^	###
Share of the population over age 25 with at least some college education	43.7%	63.8% ††	46.4% ^^^	69.4% †† ^	###
Share of the population over age 25 that is working	58.3%	59.7%	55.3%	63.2% †	###
Share of the population with income below the poverty line	25.2%	10.9% ††	24.7% ^^^	8.1% ††	###
Per-capita income	\$22,033	\$37,785 ††	\$21,783 ^^^	\$40,160 ††	###
Share of households with income less than \$10,000	11.8%	5.5% ††	11.8% ^^^	4.2% ††	###
Share of households with income less than \$15,000	20.7%	8.7% ††	22.2% ^^^	8.0% ††	###
Share of households with income less than \$25,000	33.7%	19.0% ††	35.9% ^^^	15.6% †† ^	###
Share of households with income less than \$35,000	45.1%	27.2% ††	46.5% ^^^	23.1% †† ^	###
Share of households with income less than \$50,000	58.1%	40.7% ††	59.4% ^^^	34.0% †† ^	###
Share of households with income less than \$75,000	73.5%	60.1% ††	75.5% ^^^	49.8% †† ^^^	###
Share of households with income less than \$100,000	83.4%	74.7% †	86.0% ^^^	63.3% †† ^^^	###
Share of households with income less than \$150,000	92.6%	90.3%	95.2% ^	81.1% †† ^^^	###
Share of households that are family households*	62.4%	62.5%	58.4% †	66.0%	##
Share of family households with a female head of household	23.8%	9.4% ††	20.1% † ^^^	9.2% ††	###
Share of units that are renter-occupied	61.9%	27.4% ††	61.2% ^^^	25.7% ††	###
Share of rented units with rent more than 30 percent of household income	52.7%	50.1%	51.6%	42.1% †† ^	###
Share of owned units with mortgage more than 30 percent of household income	35.0%	29.5% †	31.2% ††	24.1% †† ^	###
Index of personal crime rate**	231.3	94.5 ††	220.6 ^^^	59.9 †† ^	###
Index of share of population volunteering in past 12 months**	69.2	126.3 ††	77.3 ^^^	124.2 ††	###
Index of share participating in a public activity in past 12 months**	99.5	108.6 ††	98.6 ^^^	110.3 ††	###
Index of share of population voting in past 12 months**	80.0	121.0 ††	86.3 † ^^^	118.0 ††	###
Share of the population over age 1 that moved in the past year	16.1%	10.2% ††	17.7% ^^^	11.1% ††	###
Share of workers employed in manufacturing	9.6%	6.6%	11.4% ^^^	9.3% ^	#
Share of workers employed in retail trade	11.7%	11.2%	11.8%	10.5%	
Share of workers employed in health or social services	19.5%	12.9% ††	19.9% ^^^	15.2% †† ^	###
Share of workers employed in accommodation or food service	9.7%	8.6%	9.2%	5.5% †† ^	

continued

continued

	COMMUNITY TYPE			
	ENTRENCHED RISK	UNEXPECTED RISK	RESILIENT	LOW RISK
	High uninsured and predicted high uninsured	High uninsured but not predicted high uninsured	Relatively low uninsured but predicted high uninsured	Relatively low uninsured and not predicted high uninsured
Average uninsurance nationally	16.2%	12.4%	4.4%	3.0%
Average uninsurance in Massachusetts	8.5%	9.3%	4.8%	2.7%
PHYSICAL CHARACTERISTICS OF THE COMMUNITY				
Housing unit vacancy rate	14.5%	30.1% †††	9.4% ^^^	13.3% ^^^
Index of property crime rate**	116.0	88.8	123.0	56.1 ††† ^ ^
Distance to nearest ZCTA with a supermarket or grocery store	0.1	1.5 †††	0.1 ^^^	1.2 ††† ###
Distance to nearest ZCTA with a limited-service restaurant	0.1	1.8 †††	0.0 ^^^	1.0 †† ^
Distance to nearest ZCTA with a liquor store	0.1	1.4 †††	0.0 ^^^	1.1 ††† #
Distance to nearest ZCTA with a bar or drinking place	0.4	3.9 †††	0.0 * ^^^	2.6 ††† ^ ^
Distance to nearest ZCTA with fitness, recreation, or sporting facilities	0.3	2.1 †††	0.3 ^^^	1.8 ††† ###
Distance to nearest ZCTA with an elementary school	0.8	3.6 †††	0.4 ^^^	2.4 ††† ^ ^
Distance to nearest ZCTA with a child-care facility	0.3	1.8 †††	0.0 ^^^	1.1 † #
Distance to nearest ZCTA with social services establishments	0.2	2.7 †††	0.1 ^^^	2.0 ††† ###
Distance to nearest ZCTA with a pharmacy or drugstore	0.3	2.6 †††	0.1 ^^^	1.9 ††† ###
Distance to nearest ZCTA with a religious building	0.1	0.8 †††	0.0 ^ ^	0.5 † #
Distance to nearest ZCTA with arts and entertainment facilities	0.8	1.9 †	0.9	2.3 ††† #
Distance to nearest ZCTA with a hospital	2.7	6.9 †††	2.1 ^^^	6.1 ††† ###
Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	1.0	7.7 †††	1.3 ^^^	5.9 ††† ^ ^
Distance to nearest ZCTA with a mental health or substance use facility	0.7	5.3 †††	0.8 ^^^	4.5 ††† ###
Distance to nearest ZCTA with a physician's office	0.3	1.5 ††	0.1 ^^^	1.5 ††† ###
Distance to nearest ZCTA with a mental health practitioner's office	1.2	6.9 †††	1.2 ^^^	3.2 ††† ^^^ #
Distance to nearest ZCTA with a dentist's office	0.1	2.0 †††	0.0 ^^^	1.4 ††† ###
Rural-urban continuum code	1.5	3.0 †††	1.5 ^^^	1.8 ^^^
Land area (square miles)	4.2	14.8 †††	6.8 ^	15.7 ††† ###
Population density (persons per square mile)	9,422	1,597 †††	7,180 ^^^	2,434 ††† ###
Sample size	30	23	23	455

Source: Analysis based on 531 ZCTAs in Massachusetts.

†/††/††† Difference from expected high-uninsured communities is significant at the 0.1/0.05/0.01 level.

^/^^/^^^ Difference from unexpected high-insured communities is significant at the 0.1/0.05/0.01 level.

#/###/#### Difference from unexpected lower-uninsured communities is significant at the 0.1/0.05/0.01 level.

* A family household is any household in which the householder is related to any other household members, including by marriage.

** All indices are based on comparison with the national average, which is set to a value of 100.

TECHNICAL APPENDIX TABLE 5: CHARACTERISTICS OF MASSACHUSETTS COMMUNITIES, BY OBSERVED HIGH UNINSURANCE AND HIGH POVERTY

	COMMUNITY TYPE			
	HIGH-HIGH High uninsured and high poverty	HIGH-LOW High uninsured but not high poverty	LOW-HIGH Relatively low uninsured but high poverty	LOW-LOW Relatively low uninsured and not high poverty
Average uninsurance nationally	21.2%	14.4%	2.9%	3.7%
Average uninsurance in Massachusetts	9.0%	8.7%	4.0%	2.8%
CHARACTERISTICS OF PEOPLE IN THE COMMUNITY				
Share of the population under age 18	25.5%	18.8% †††	16.4% †††	19.8% ††† ###
Share of the population over age 65	10.4%	16.9% †††	14.0%	17.7% ††† #
Share of the population that is male	47.5%	48.7%	50.9%	47.7% ###
Share of the population that is Hispanic or not white	53.8%	19.7% †††	37.2% †††	9.9% ††† ###
Share of the population over age 25 that is married	45.1%	54.2% †††	42.4%	63.0% ††† ###
Share of the population that is foreign born	23.9%	14.6% ††	17.9%	8.8% ††† ###
Share of the population over age 25 with at least some college education	41.6%	58.5% †††	57.3% †††	69.1% ††† ###
Share of the population over age 25 that is working	54.0%	61.7% ††	48.9%	63.9% ††† ###
Share of the population with income below the poverty line	32.3%	11.6% †††	32.6%	7.1% ††† ###
Per-capita income	\$18,863	\$34,460 †††	\$24,393 †††	\$40,415 ††† ###
Share of households with income less than \$10,000	14.6%	5.9% †††	15.1%	3.7% ††† ###
Share of households with income less than \$15,000	25.3%	10.1% †††	24.6%	7.4% ††† ###
Share of households with income less than \$25,000	40.6%	19.8% †††	35.9%	15.1% ††† ###
Share of households with income less than \$35,000	51.8%	29.3% †††	44.8%	22.6% ††† ###
Share of households with income less than \$50,000	64.2%	42.9% †††	55.9%	33.7% ††† ###
Share of households with income less than \$75,000	78.6%	61.6% †††	72.2%	49.5% ††† ###
Share of households with income less than \$100,000	88.4%	74.8% †††	82.1%	63.0% ††† ###
Share of households with income less than \$150,000	96.7%	88.8% ††	91.7%	81.1% ††† ###
Share of households that are family households*	61.6%	62.9%	51.8%	66.7% ††† ###
Share of family households with a female head of household	25.5%	13.2% †††	16.5%	9.2% ††† ###
Share of units that are renter-occupied	65.2%	36.8% †††	58.9%	25.0% ††† ###
Share of rented units with rent more than 30 percent of household income	57.4%	48.3% ††	51.3%	41.9% ††† ###
Share of owned units with mortgage more than 30 percent of household income	35.4%	31.0%	29.1%	24.1% ††† ###
Index of personal crime rate**	254.8	125.7 †††	218.4 †††	56.1 ††† ###
Index of share of population volunteering in past 12 months**	70.9	106.9 †††	91.3 †††	124.3 ††† ###
Index of share participating in a public activity in past 12 months**	95.6	107.9 †††	101.8 †††	110.4 ††† ###
Index of share of population voting in past 12 months**	78.8	108.4 †††	95.7 †††	118.0 ††† ###
Share of the population over age 1 that moved in the past year	17.5%	11.3% †††	21.6%	10.6% ††† ###
Share of workers employed in manufacturing	11.5%	6.5% †††	7.0%	9.6% ††† ###
Share of workers employed in retail trade	13.5%	10.3% †††	11.7%	10.5% †††
Share of workers employed in health or social services	19.1%	15.2%	17.2%	15.3% ††† #
Share of workers employed in accommodation or food service	9.3%	9.2%	9.3%	5.4% ††† ###

continued

continued

	COMMUNITY TYPE			
	HIGH-HIGH High uninsured and high poverty	HIGH-LOW High uninsured but not high poverty	LOW-HIGH Relatively low uninsured but high poverty	LOW-LOW Relatively low uninsured and not high poverty
Average uninsurance nationally	21.2%	14.4%	2.9%	3.7%
Average uninsurance in Massachusetts	9.0%	8.7%	4.0%	2.8%
PHYSICAL CHARACTERISTICS OF THE COMMUNITY				
Housing unit vacancy rate	10.9%	27.0% †††	13.0% ^^^	13.1% ^^^
Index of property crime rate**	120.5	95.0	134.6	53.6 ††† ^^^ ###
Distance to nearest ZCTA with a supermarket or grocery store	0.2	0.9 †	0.5	1.2 †† ##
Distance to nearest ZCTA with a limited-service restaurant	0.2	1.1	0.3 ^^	1.0 ##
Distance to nearest ZCTA with a liquor store	0.2	0.9 †	0.6	1.1 ††
Distance to nearest ZCTA with a bar or drinking place	0.1	3.0 †††	0.6 ^^^	2.6 ††† ###
Distance to nearest ZCTA with fitness, recreation, or sporting facilities	0.6	1.3	1.1	1.8 †
Distance to nearest ZCTA with an elementary school	0.7	2.8 ††	0.9 ^^^	2.4 †† ###
Distance to nearest ZCTA with a child-care facility	0.1	1.5 ††	0.4 ^^	1.1 † #
Distance to nearest ZCTA with social services establishments	0.4	1.8 ††	0.9	2.0 ††† ##
Distance to nearest ZCTA with a pharmacy or drugstore	0.3	1.8 ††	0.9 *	1.9 ††† ##
Distance to nearest ZCTA with a religious building	0.1	0.6	0.4	0.5
Distance to nearest ZCTA with arts and entertainment facilities	1.1	1.4	1.0	2.3 †† ^^ ###
Distance to nearest ZCTA with a hospital	3.2	5.3	2.7 ^^	6.2 ††† ###
Distance to nearest ZCTA with a Federally Qualified Health Center or Rural Health Clinic	1.0	5.5 †††	2.9 ^^	5.9 ††† ###
Distance to nearest ZCTA with a mental health or substance use facility	0.9	3.8 †††	1.6 ^^^	4.5 ††† ###
Distance to nearest ZCTA with a physician's office	0.4	1.0	0.8	1.5 †† #
Distance to nearest ZCTA with a mental health practitioner's office	0.6	5.4 †††	1.3 ^^^	3.2 ††† ^^^ ###
Distance to nearest ZCTA with a dentist's office	0.2	1.4 †	0.8 *	1.4 ††
Rural-urban continuum code	1.7	2.4	1.5 ^^^	1.8 ^^^ #
Land area (square miles)	2.8	12.2 ††	4.7 ^^	16.1 ††† ###
Population density (persons per square mile)	9,118	4,298 †††	9,480 ^^	2,140 ††† ^^ ###
COMPARISON WITH OBSERVED AND PREDICTED HIGH UNINSURANCE				
Number of entrenched-risk communities	17	13	0	0
Number of unexpected-risk communities	2	21	0	0
Number of resilient communities	0	0	13	10
Number of low-risk communities	0	0	21	434
Sample size	19	34	34	444

Source: Analysis based on 531 ZCTAs in Massachusetts.

†/††/††† Difference from high-high communities is significant at the 0.1/0.05/0.01 level.

^/^^/^^^ Difference from high-low communities is significant at the 0.1/0.05/0.01 level.

#/###/#### Difference from low-high communities is significant at the 0.1/0.05/0.01 level.

* A family household is any household in which the householder is related to any other household members, including by marriage.

** All indices are based on comparison with the national average, which is set to a value of 100.

15
years



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