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# Expansion of Coverage under the Patient Protection and Affordable Care Act and Primary Care Utilization

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**Context:** Provisions of the Patient Protection and Affordable Care Act of 2010 (PPACA) expand Medicaid to all individuals in families earning less than 133 percent of the federal poverty level (FPL) and make available subsidies to uninsured lower-income Americans (133 to 400 percent of FPL) without access to employer-based coverage to purchase insurance in new exchanges. Since primary care physicians typically serve as the point of entry into the health care delivery system, an adequate supply of them is critical to meeting the anticipated increase in demand for medical care resulting from the expansion of coverage. This article provides state-level estimates of the anticipated increases in primary care utilization given the PPACA's provisions for expanded coverage.

**Methods:** Using the Medical Expenditure Panel Survey, this article estimates a multivariate regression model of annual primary care utilization. Using the model estimates and state-level information regarding the number of uninsured, it predicts, by state, the change in primary care visits expected from the expanded coverage. Finally, the article predicts the number of primary care physicians needed to accommodate this change in utilization.

**Findings:** This expanded coverage is predicted to increase by 2019 the number of annual primary care visits between 15.07 million and 24.26 million. Assuming stable levels of physicians' productivity, between 4,307 and 6,940 additional primary care physicians would be needed to accommodate this increase.

**Conclusions:** The PPACA's health insurance expansion parameters are expected to significantly increase the use of primary care. Two strategies that policymakers may consider are creating stronger financial incentives to attract medical

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school students to primary care and changing the delivery of care in ways that lead to operational improvements, higher throughput, and better quality of care.

**Keywords:** Primary care, health insurance, workforce.

Robust primary care systems are associated with lower health care spending, reduced health disparities, and higher quality of care (Starfield, Shi, and Macinko 2005). Nonetheless, over time there has been a notable shift in the percentage of physicians choosing specialty care over primary care. Given the aging of the population and the rising prevalence of disease, many experts believe that there is a shortage of primary care physicians (Bodenheimer, Grumbach, and Berensen, 2009; Bodenheimer and Pham 2010; Colwill, Cultice, and Kruse 2008).

Provisions of the Patient Protection and Affordable Care Act of 2010 (PPACA) extend Medicaid to all individuals in families earning less than 133 percent of the federal poverty level (FPL) and make available subsidies to uninsured lower-income Americans (133 to 400 percent of FPL) without access to employer-based coverage to purchase insurance in newly created exchanges. The Congressional Budget Office (CBO) estimates that these provisions will lead to 32 million individuals gaining coverage by 2019 (Elmendorf 2010). Since primary care physicians typically serve as the point of entry into the health care delivery system, an adequate supply is critical to meeting the anticipated increase in demand for medical care resulting from the expansion of coverage.

Empirical research has consistently shown that individuals with health insurance use more medical care than do the uninsured (Ezzati-Rice and Rohde 2008; Kashihara and Carper 2009). A literature review by Buchmueller and colleagues (2005) summarized the existing research on the relationship between health insurance and utilization of medical care by children and adults. Specifically, they summarized the findings of observational studies and natural experiments with earlier, state-based Medicaid or federal expansions of coverage (e.g., Children's Health Insurance Program). The authors concluded that gaining coverage leads to both a higher probability of an individual's obtaining any care and a larger number of visits (see, e.g., Almeida, Dubay, and Ko 2001; Banthin and Selden 2003; Lave et al. 1998; Marquis and Long 1994/1995).

Earlier research did not distinguish between visits made to primary care physicians and those made to specialists, a factor potentially limiting their usefulness for projecting utilization increases specific to primary care and corresponding workforce needs. In addition, gains in coverage based on the legislation will vary substantially by geographic region. Some states have stronger safety net systems to facilitate uninsured persons' access to care, but others do not. Thus, state-level estimates may be important to policymakers considering ways of addressing workforce shortages.

Our study provides new estimates of the anticipated increase in primary care utilization resulting from the PPACA's expansion of coverage. Using the nationally representative Medical Expenditure Panel Survey-Household Component, we estimated a multivariate regression model of the annual utilization of primary care by the nonelderly U.S. population. Then, using the model estimates and current state-level information about the number of uninsured, we predicted the change in primary care visits by state that would be expected from an expansion of coverage. Finally, using published estimates of physicians' productivity, we estimated the number of primary care physicians that each state would need to accommodate this increase in demand by the newly insured population and compared that with the existing number of primary care physicians.

## Methods

### *Data*

Our primary data source was the 2006 and 2007 Medical Expenditure Panel Survey-Household Component (MEPS-HC). The MEPS-HC is a nationally representative survey of the noninstitutionalized civilian population of the United States and contains comprehensive information about individuals' demographics, income, and employment characteristics; health status and medical conditions; health care services utilization and expenditures; and health insurance (see www.meps.ahrq.gov 2010). We pooled two panels to increase the sample sizes for each type of health insurance, including the full-year uninsured.

We also used three other data sources. The first was the 2008 American Community Survey (ACS), which is an ongoing national survey conducted by the U.S. Census Bureau that provides one-year estimates of national- and state-level demographic, social, economic, and housing characteristics (American Community Survey 2008). From these data, we obtained estimates of the number of persons without health insurance, by state and breakdown by age, sex, and household income. Second, we used the Medical Group Management Association's Physician Compensation and Production Survey to obtain primary care estimates of physicians' productivity (MGMA 2009). Last, we used the 2008 Area Resource File to generate state-level estimates of the number of primary care physicians (total number of physicians in general practice, general internal medicine, general pediatrics, and general obstetrics/gynecology).

### *Measures*

The outcome of interest for our model was an individual's self-reported, total number of office-based visits to a primary care physician during the calendar year. Using the MEPS Office-Based Provider Visit Events File, we applied two criteria for classifying primary care visits: (1) the individual had to have interacted with a physician in person during the visit, and (2) the individual indicated that the physician's specialty was family practice, general practice, general internal medicine, general pediatrics, or obstetrics/gynecology. We then aggregated each person's visits for the calendar year.

Drawing from the theoretical and empirical literature on the demand for medical care, we included several demographic factors, such as age (0 to 17, 18 to 24, 25 to 44, 45 to 64), sex (female), race and ethnicity (white, black, Hispanic, and other races), marital status (married, single, divorced/separated, and widowed), education (less than a high school diploma, high school diploma, some college, bachelor's degree, postbaccalaureate), English-language proficiency, household size (number of individuals in the health insurance eligibility unit), geographic region (Northeast, Midwest, South, West), and residence in a metropolitan statistical area. Also included were a set of binary indicator variables to capture whether an individual reported having any of the following conditions during the year: pregnancy, cancer, diabetes, mood disorders, heart disease, asthma, or hypertension. These represented our measures of health status.

Economic factors that are likely to be associated with the demand for medical care are household income ($2010) and employment status (full-time, full-year; full-time, part-year; part-time, full-year; part-time, part-year; and not working for the full year). Finally, we measured an individual's health insurance by constructing a set of indicator variables corresponding to one of six types of health insurance: full-year uninsured, part-year uninsured (being uninsured for one to eleven months), full-year employer-sponsored insurance (ESI), full-year other private insurance (nongroup coverage), full-year public insurance (Medicaid, Medicare, other state programs, and TRICARE), and full-year mixed insurance (two or more types of insurance but no coverage gaps).

### *Analyses*

Our unit of analysis was a person-year. Pooling the 2006 and 2007 MEPS data, we had a total sample size of 51,340 person-years, including 17,572 children and 33,768 adults. Next we describe the sequence of steps that we used to project the increase in primary care utilization and the corresponding number of physicians that would be expected to accommodate the increase in demand.

First, we estimated multivariate regression models of the factors associated with an individual's annual number of primary care visits, separately for children (ages 0 to 17) and nonelderly adults (18 to 64).[1] The number of annual primary care visits was specified as depending on a person's demographic characteristics, health status, economic factors, a set of binary indicators for the type of health insurance reported by the individual (ESI, public, mixed, other private, part-year uninsured, and full-year uninsured [reference category]), and a random error term. The distribution of the number of annual primary care visits was discrete with a long right tail, so we used negative binomial regression to estimate the model. To facilitate interpretation, we also estimated marginal effects and standard errors. Since the MEPS's survey design is complex, we used survey commands in STATA (version 11) to obtain correct standard errors.

Second, for the subsample of full-year uninsured persons, we used parameter estimates from the model to predict the annual number of primary care visits that each person would be expected to make, given his or her own values of the explanatory variables (including being full-year uninsured) and assuming mean unobserved characteristics. Next, for this same group, we predicted the annual number of primary care visits that each person would be expected to make, given his or her own values of the explanatory variables, but now assuming that he or she had health insurance. Specifically, we assumed that their behavioral response would be similar to that of persons with employer-sponsored coverage. Our justification for this assumption was based on a careful analysis of individuals' characteristics (e.g., demographics, health status) by insurance type, in which we observed the strongest similarity between the full-year uninsured and the ESI-covered populations, relative to comparisons of the full-year uninsured with other groups, including those with public insurance. For each full-year uninsured person, we then constructed a new variable to capture the change in number of visits resulting from changing from a status of full-year uninsured to having insurance. We then summarized this new variable for eight mutually exclusive subgroups within the full-year uninsured population, defined by age, sex, and household income strata. We used the twenty-fifth and seventy-fifth percentile values of the change in number of predicted visits to create a lower- and an upper-bound estimate of the behavioral response for each of the eight subgroups.

Our third step was using the 2008 American Community Survey to generate estimates of the number of uninsured by age, sex, and household income within each state. We then scaled these estimates by 1.234 to reflect the CBO's projection of 23.4 percent growth in the number of uninsured nationally from 43.7 million to 54.0 million in 2019. Since the CBO projections suggest that only 32 million of the expected 54 million uninsured will obtain coverage, given the reform provisions, we must assume which groups of uninsured individuals will gain coverage. Under the PPACA, starting in 2014, all individuals below 133 percent of FPL will be eligible for Medicaid. Premium assistance credits, determined on a sliding scale, will be available to citizens and legal residents who do not have access to employer-sponsored insurance and whose income is between 133 and 400 percent of FPL. Because uninsured individuals with incomes below 200 percent of FPL will face almost no out-of-pocket costs to obtain coverage, we assumed that all of them will gain coverage. Also in 2014, an individual mandate goes into effect. This policy should reinforce the exchanges' absorption of lower-income Americans with Medicaid or fully subsidized private insurance. Above this income threshold, we then allocated equal percentages of individuals from middle- and higher-income uninsured groups in each state until the national total reflected an expansion to 32 million uninsured. Using the estimated behavioral responses to gaining insurance and the state-level estimates of the full-year uninsured, we produced lower- and upper-bound estimates of the increased number of primary care visits.

The final step was projecting the number of additional primary care physicians that would be needed to meet the increased use of expansion-related primary care. To make the conversion from number of visits to number of physicians, we obtained a measure of a physician's average productivity, defined as the mean number of annual ambulatory encounters per FTE family medicine physician with obstetrics for each geographic region. We calculated the projected number of additional physicians by dividing the total number of additional visits in a state by the number of physician encounters per year for the corresponding region in which the state is located.

## Results

Table 1 provides summary statistics. The mean number of annual visits is 1.52 and 1.54 for children and adults, respectively. The distribution of visits is positively skewed with a mode at 0. More than 48 percent of adults made no visits to a primary care physician, while 9.5 percent made five or more visits during the year.

### *Multivariate Results*

The marginal effects and standard errors for the negative binomial regression models are reported in table 2. For children, several demographic attributes were significantly associated with primary care utilization. Age was inversely related to annual visits, in which each additional year of age was associated with a child's making 0.109 fewer visits during the year, holding all else constant. We also observed differences in utilization by race and ethnicity, with white children making the most visits on average, followed by Hispanic children, children of "other races," and black children.

Not surprisingly, children in poorer health made a higher number of primary care visits throughout the year. This was particularly true for children with mood disorders (e.g., anxiety or depression) or asthma.

TABLE 1
Summary Statistics for Children and Adult Samples

| | Children ($n$ = 17,572) | | Adults ($n$ = 33,768) | |
|---|---|---|---|---|
| | Mean/Percent | SD | Mean/Percent | SD |
| PCP visits | 1.52 | 2.09 | 1.54 | 2.64 |
| Age | 9.00 | 5.01 | 40.63 | 13.02 |
| Gender | | | | |
| Male | 50.71 | NA | 48.76 | NA |
| Female | 49.29 | NA | 51.24 | NA |
| Race/ethnicity | | | | |
| White | 56.86 | NA | 67.61 | NA |
| Black | 14.56 | NA | 11.52 | NA |
| Hispanic | 20.86 | NA | 14.12 | NA |
| Other | 7.72 | NA | 6.75 | NA |
| Household size | 4.21 | 1.43 | 2.59 | 1.49 |
| Household income | $52,289 | $51,184 | $56,806 | $53,901 |
| Employment status | | | | |
| Full-time, full-year | — | — | 64.11 | NA |
| Part-time, full-year | — | — | 10.78 | NA |
| Full-time, part-year | — | — | 4.44 | NA |
| Part-time, part-year | — | — | 2.75 | NA |
| Not working (full-year) | — | — | 17.92 | NA |
| Years of education | | | | |
| 0 to 11 years | — | — | 16.69 | NA |
| 12 years | — | — | 29.80 | NA |
| 13 to 15 years | — | — | 24.55 | NA |
| 16 years | — | — | 18.03 | NA |
| ≥17 years | — | — | 10.93 | NA |
| English-language proficiency | | | | |
| Yes | 91.10 | NA | 93.97 | NA |
| No | 8.90 | NA | 6.03 | NA |
| Marital status | | | | |
| Married | — | — | 55.44 | NA |
| Single | — | — | 28.53 | NA |
| Divorced/separated | — | — | 14.30 | NA |
| Widowed | — | — | 1.73 | NA |
| MSA | | | | |
| MSA | 84.12 | NA | 84.07 | NA |
| Non-MSA | 15.88 | NA | 15.93 | NA |

*Continued*

TABLE 1—*Continued*

| | Children ($n$ = 17,572) | | Adults ($n$ = 33,768) | |
|---|---|---|---|---|
| | Mean/Percent | SD | Mean/Percent | SD |
| Census region | | | | |
| Northeast | 16.63 | NA | 18.35 | NA |
| Midwest | 22.13 | NA | 22.27 | NA |
| South | 36.94 | NA | 36.04 | NA |
| West | 24.30 | NA | 23.35 | NA |
| Pregnant | — | — | 3.73 | NA |
| Cancer | 0.29 | NA | 3.75 | NA |
| Diabetes | 0.23 | NA | 6.34 | NA |
| Mood disorders | 2.46 | NA | 15.64 | NA |
| Heart disease | — | — | 2.29 | NA |
| Asthma | 8.30 | NA | 4.60 | NA |
| Hypertension | — | — | 15.80 | NA |

Finally, with respect to health insurance, we observed that a child who was covered throughout the year under an employer-sponsored policy made 0.740 more visits per year on average than did a child who was uninsured for the full year. We found a similar magnitude of effects for full-year mixed coverage (0.809), public insurance (0.783), and other private insurance (0.654), compared with full-year uninsured children.

For adults, we also observed several significant associations between demographic characteristics and utilization. Older individuals made more visits on average. Each additional year of age was associated with a 0.017 increase in the number of visits for females and a slightly larger effect for males (0.019), holding all else constant. Differences in utilization by race and ethnicity were more pronounced in females than males. For example, Hispanic females made 0.252 more visits on average, compared with non-Hispanic females. We found slightly smaller magnitudes for white and black females and those classified as "other race." In the adult models, we also included measures of education and employment. Across education categories, females with more education made a significantly larger number of visits compared with women without a high school diploma. We found no analogous differences among males. Individuals who were employed full-year and full-time made fewer visits than did those who were not working. Presumably, individuals in better health are more able to work and less likely to seek medical care.

TABLE 2
Negative Binomial Regression Output for Children, Adult Females, and Adult Males (marginal effects and standard errors reported)

| Variable | Children | | Adult Females | | Adult Males | |
|---|---|---|---|---|---|---|
| | Marginal effect | SE | Marginal effect | SE | Marginal effect | SE |
| Age | −.109** | .0042 | .017** | .022 | .019** | .001 |
| Household size | −.138** | .015 | −.073** | .020 | −.032* | .013 |
| Household income | .0000** | .0000 | −.0000 | .0000 | −.0000** | .0000 |
| Female | .016 | .037 | . . . | . . . | . . . | . . . |
| Male | Ref | Ref | . . . | . . . | . . . | . . . |
| White | .348** | .063 | .202* | .088 | .117* | .058 |
| Black | −.142 | .073 | .231* | .116 | .072 | .079 |
| Hispanic | .214* | .083 | .252* | .124 | −.024 | .074 |
| Other | Ref | Ref | Ref | Ref | Ref | Ref |
| Northeast | .395** | .092 | .232** | .083 | .210* | .062 |
| Midwest | .166* | .070 | .138 | .080 | .080 | .051 |
| South | .229** | .065 | .230** | .076 | .141** | .046 |
| West | Ref | Ref | Ref | Ref | Ref | Ref |
| MSA | .148** | .055 | −.012 | .075 | .025 | .044 |
| Non-MSA | Ref | Ref | Ref | Ref | Ref | Ref |
| Married | | | .228** | .073 | .149** | .056 |
| Divorced/ separated | | | .247** | .093 | .010 | .056 |
| Widowed | | | .324* | .143 | .100 | .174 |
| Single | | | Ref | Ref | Ref | Ref |
| English-language proficiency | .009 | .080 | −.072 | .111 | .005 | .096 |
| Less than high school diploma | | | Ref | Ref | Ref | Ref |
| High school diploma | | | .008 | .064 | −.043 | .059 |
| Some college | | | .089 | .068 | −.012 | .061 |
| College degree | | | .219** | .083 | −.015 | .064 |
| Graduate work | | | .183* | .091 | .057 | .095 |
| Full-time full-year employment | | | −.249** | .053 | −.194** | .063 |
| Part-time full-year employment | | | −.118 | .065 | −.146* | .060 |

*Continued*

TABLE 2—*Continued*

| | Children | | Adult Females | | Adult Males | |
|---|---|---|---|---|---|---|
| Variable | Marginal effect | SE | Marginal effect | SE | Marginal effect | SE |
| Full-time part-year employment | | | −.283** | .094 | −.170** | .059 |
| Part-time part-year employment | | | −.296** | .010 | −.027 | .100 |
| Not working (FY) | | | Ref | Ref | Ref | Ref |
| Pregnant | | | 6.03** | .225 | ... | ... |
| Cancer | .567 | .327 | .641** | .130 | .262** | .089 |
| Diabetes | .703* | .336 | 1.12** | .132 | .952** | .118 |
| Anxiety/depression | 1.39** | .267 | .869** | .060 | .600** | .065 |
| Heart disease | | | .538** | .143 | .377** | .084 |
| Asthma | .887** | .091 | .897** | .114 | .554** | .097 |
| Uninsured (FY) | Ref | Ref | Ref | Ref | Ref | Ref |
| Uninsured (PY) | .299* | .118 | .897** | .114 | .388** | .064 |
| ESI (FY) | .740** | .112 | 1.254** | .089 | .510** | .058 |
| Other private insurance (FY) | .654** | .168 | 1.092** | .143 | .245** | .094 |
| Public insurance (FY) | .783** | .140 | 1.982** | .188 | 1.189** | .194 |
| Mixed insurance (FY) | .809** | .171 | 1.497** | .163 | .461** | .145 |

*Notes:* For children, the dependent variable includes primary care visits from general pediatricians, family/general practice, and general internal medicine.
For male adults, the dependent variable includes primary care visits from family/general practice and general internal medicine.
For female adults, the dependent variable includes visits from obstetricians/gynecologists, family/general practice, and general internal medicine physicians.
*p < .05, **p < .01.

Our model specifications also contained variables corresponding to the individual's geographic region. We found that people living in the Northeast and the South made more visits, compared with those living in the West. We saw no evidence of differences in utilization by whether or not a person lived in a metropolitan area.

We also examined how health status affects primary care utilization and found statistically significant effects on all six indicators. Pregnancy yielded the largest effect (six more visits, on average), followed by diabetes (1.12 more visits for females and 0.952 for males), anxiety/depression (0.87 more visits for females and 0.60 for males), asthma (0.90 more visits for females and 0.55 for males), heart disease (0.54 more visits for females and 0.38 for males), and cancer (0.64 more visits for females and 0.26 for males).

Finally, we observed large and statistically significant differences in the number of primary care visits by adults' insurance status, with females showing larger responses than males. For adult females, having public insurance was associated with making 1.98 more visits on average, relative to being full-year uninsured. We found smaller effects for all other types of insurance versus females who lacked coverage throughout the year, including full-year mixed insurance (1.49 more visits), full-year ESI (1.25 more visits), other private insurance (1.09 more visits), and part-year uninsured (0.90 more visits). For adult males, having public insurance was associated with the largest difference, 1.19 more visits on average, compared with full-year uninsured. The marginal effects on the other insurance categories were between 0.245 and 0.510 more visits on average, compared with the full-year uninsured.

## *Predicted Increase in Annual Primary Care Visits by State*

We used the model estimates and the 2008 ACS to generate state-level projections of the number of additional primary care visits that would result from the PPACA's expansion of coverage, shown in table 3.

From columns (2) and (3), we see that the expansion of coverage to 32 million uninsured is predicted to increase annual primary care utilization between 15.07 million and 24.30 million visits in 2019. The upper bound equates to a 7.9 percent increase over the current utilization (307 million visits based on our tabulation of MEPS data) among the nonelderly population. Seven states (Alaska, Delaware, Hawaii, North Dakota, South Dakota, Vermont, and Wyoming) and the District of Columbia are estimated to have increases of fewer than fifty thousand additional visits, while three states (California, Florida, and Texas) are projected to have an increase in the number of visits by more than one million per year.

TABLE 3
State-Level Estimates of the Uninsured, Predicted Increase in Annual Visits, and Corresponding Primary Care Physician Workforce Demand

| State | Uninsured Population (scaled to 2019) | Estimated Range of Increase in Annual Primary Care Utilization | | Estimated Range of Additional Primary Care Physicians Needed | | Existing Supply of PCPs (2008 estimates) |
|---|---|---|---|---|---|---|
| | | Lower Bound | Upper Bound | Lower Bound | Upper Bound | |
| Alabama | 774,663 | 234,637 | 376,439 | 67 | 108 | 3,707 |
| Alaska | 110,062 | 23,018 | 36,327 | 7 | 10 | 613 |
| Arizona | 1,342,449 | 372,879 | 613,152 | 107 | 175 | 4,475 |
| Arkansas | 603,370 | 186,588 | 297,471 | 53 | 85 | 2,193 |
| California | 7,760,441 | 2,143,621 | 3,447,498 | 612 | 985 | 34,351 |
| Colorado | 994,816 | 270,802 | 442,295 | 77 | 126 | 4,336 |
| Connecticut | 366,560 | 84,219 | 134,943 | 24 | 39 | 4,220 |
| Delaware | 111,294 | 27,464 | 45,076 | 8 | 13 | 696 |
| D.C. | 52,584 | 13,637 | 21,568 | 4 | 6 | 1,197 |
| Florida | 4,539,426 | 1,245,099 | 2,036,938 | 356 | 582 | 14,863 |
| Georgia | 2,177,914 | 618,987 | 996,194 | 177 | 285 | 7,491 |
| Hawaii | 100,458 | 26,033 | 41,245 | 7 | 12 | 1479 |
| Idaho | 315,433 | 92,694 | 150,921 | 26 | 43 | 973 |
| Illinois | 1,959,655 | 535,902 | 851,152 | 153 | 243 | 13,155 |
| Indiana | 1,043,344 | 296,916 | 478,551 | 85 | 137 | 5,044 |
| Iowa | 308,157 | 90,158 | 143,044 | 26 | 41 | 1,998 |
| Kansas | 414,044 | 117,839 | 191,058 | 34 | 55 | 2,224 |

*Continued*

TABLE 3—*Continued*

| State | Uninsured Population (scaled to 2019) | Estimated Range of Increase in Annual Primary Care Utilization | | Estimated Range of Additional Primary Care Physicians Needed | | Existing Supply of PCPs (2008 estimates) |
|---|---|---|---|---|---|---|
| | | Lower Bound | Upper Bound | Lower Bound | Upper Bound | |
| Kentucky | 714,418 | 233,976 | 370,721 | 67 | 106 | 3,483 |
| Louisiana | 937,056 | 269,722 | 429,607 | 77 | 123 | 3,975 |
| Maine | 165,593 | 43,637 | 69,997 | 12 | 20 | 1,379 |
| Maryland | 738,788 | 170,191 | 270,081 | 49 | 77 | 6,874 |
| Massachusetts | 315,444 | 80,974 | 128,197 | 23 | 37 | 8,652 |
| Michigan | 1,375,758 | 421,145 | 666,727 | 120 | 190 | 8,936 |
| Minnesota | 529,301 | 135,790 | 218,529 | 39 | 59 | 5,615 |
| Mississippi | 619,812 | 192,942 | 315,159 | 55 | 90 | 1,883 |
| Missouri | 914,288 | 271,570 | 432,027 | 78 | 123 | 4,659 |
| Montana | 185,018 | 49,459 | 80,545 | 14 | 23 | 787 |
| Nebraska | 225,547 | 68,313 | 109,935 | 20 | 31 | 1,654 |
| Nevada | 670,683 | 168,923 | 280,944 | 48 | 80 | 1,762 |
| New Hampshire | 172,748 | 35,277 | 55,900 | 10 | 16 | 1,319 |
| New Jersey | 1,277,591 | 292,849 | 470,626 | 84 | 134 | 9,535 |
| New Mexico | 418,421 | 122,758 | 197,787 | 35 | 57 | 1,728 |
| New York | 2,719,336 | 697,205 | 1,105,810 | 199 | 316 | 25,151 |
| North Carolina | 1,757,566 | 524,635 | 841,124 | 150 | 240 | 7,926 |
| North Dakota | 58,426 | 16,590 | 25,711 | 5 | 7 | 632 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ohio | 1,623,653 | 478,540 | 774,315 | 137 | 221 | 10,521 |
| Oklahoma | 710,368 | 203,895 | 325,696 | 58 | 93 | 2,252 |
| Oregon | 739,173 | 215,116 | 348,474 | 61 | 100 | 3,774 |
| Pennsylvania | 1,406,073 | 380,175 | 611,987 | 109 | 175 | 11,753 |
| Rhode Island | 130,587 | 32,228 | 51,618 | 9 | 15 | 1,328 |
| South Carolina | 902,987 | 271,491 | 439,839 | 78 | 126 | 3,731 |
| South Dakota | 77,832 | 21,660 | 35,006 | 6 | 10 | 666 |
| Tennessee | 1,021,394 | 324,864 | 521,850 | 93 | 149 | 5,758 |
| Texas | 6,948,140 | 1,980,615 | 3,229,455 | 566 | 923 | 17,332 |
| Utah | 491,813 | 122,526 | 202,712 | 35 | 58 | 1,864 |
| Vermont | 65,658 | 13,797 | 21,737 | 4 | 6 | 853 |
| Virginia | 1,080,074 | 283,490 | 456,920 | 81 | 131 | 7,378 |
| Washington | 1,009,267 | 267,039 | 426,958 | 76 | 122 | 6,272 |
| West Virginia | 336,896 | 107,825 | 171,148 | 31 | 49 | 1,490 |
| Wisconsin | 596,220 | 173,934 | 277,543 | 50 | 79 | 5,324 |
| Wyoming | 89,403 | 19,973 | 32,197 | 6 | 9 | 403 |
| Total | 54,000,000 | 15,073,621 | 24,300,749 | 4,307 | 6,940 | 279,664 |

### *Projected Increase in Demand for Physicians by State*

The number of additional primary care physicians that would be needed by 2019 to meet this predicted increase in primary care utilization is displayed in columns (4) and (5) of table 3. For additional context, we included in column (6) our estimates of the current supply of primary care physicians reported in the Area Resource File.

If physicians' productivity remains stable, we predict that between 4,307 and 6,940 additional primary care physicians will be needed within a decade to accommodate the increased use of primary care resulting from the expansion. Our estimates also revealed considerable geographic variation with the projected number of additional primary care physicians, ranging from fewer than ten (Vermont, Wyoming, D.C., and North Dakota) to more than five hundred (California and Texas).

## Summary and Limitations

Our results suggest that the PPACA's health insurance expansion parameters will significantly increase the use of primary care by 2019, independent of other factors that also may contribute to higher utilization, such as the aging of the population and the rising prevalence of disease. The additional 15 million to 24 million visits projected to result from the coverage expansion is significant, with the magnitude of the upper bound reflecting a 7.9 percent increase relative to current utilization levels for the nonelderly population. Assuming that primary care physicians operate at capacity and cannot increase their productivity further, our calculations indicate that an additional 4,307 to 6,940 primary care physicians will be needed to accommodate the increased use, given the expansion of coverage. This increase is substantial and would be in addition to the projected increases of between 44,000 and 46,000 physicians needed within the next fifteen years to meet future primary care demand without these reforms (Colwill, Cultice, and Kruse 2008; Dill and Salsberg 2008).

Of course, other factors that we have not accounted for may influence the use of primary care following the expansion of coverage. One possibility is a short-term surge in use during which the newly insured seek treatment for existing conditions that they could not afford to have treated earlier. In those states that already have strong provider safety nets for the uninsured population, we might expect this utilization response to be smaller. Capacity constraints, given the existing number of providers, may also prevent individuals from being able to access care at the time they would like it.

Five study limitations are worth noting. First, when modeling annual primary care visits, we took individuals' health insurance status as a given. Thus to the extent that unobserved factors are associated with individuals' preferences for health insurance and medical care utilization, our estimates may be biased. We contend, however, that the size of the bias likely is small. The utilization response generated by our model falls within the range of estimates produced by earlier research that used natural experiments (e.g., between one and two additional visits following the expansion of coverage). In addition, we performed several specification checks with respect to the modeling (e.g., two-part models), finding similar magnitudes.

Second, in projecting utilization increases, we assumed that the full-year uninsured would have a care-seeking response similar to those with employer-based coverage. To check the sensitivity of our results to this assumption, we recalculated the projections under the assumption that the full-year uninsured would behave as though they had public insurance. Our results indicated an even larger response, in which the estimated number of additional visits was between 19.61 million and 30.48 million, with the corresponding workforce needs rising to between 5,604 and 8,708 primary care physicians. Thus, our main set of results is conservative.

Third, in producing our estimates, we assumed that all uninsured individuals with incomes under 200 percent FPL would gain coverage. But in those states in which a significant fraction of uninsured individuals are undocumented immigrants, this will not be the case, since this group will not be eligible for either Medicaid or exchange-based subsidies to purchase private insurance. Accordingly, the increase in utilization in these states may be overestimated.

Fourth, in modeling primary care utilization, we did not capture visits in which the provider was a nonphysician clinician, such as a nurse practitioner or physician's assistant. The percentage of visits in which patients are seen by nonphysician clinicians is still fairly small. Estimates from the 2007 MEPS Office-Based Medical Provider Visits file indicates that patients reported talking to a nurse,

nurse practitioner, or physician's assistant during 6.4 percent of their visits.

Finally, we should note that while our productivity measure for primary care physicians comes from the best available data source (MGMA), these data tend to overrepresent physicians practicing in large groups and underrepresent physicians in solo or small practices. To the extent that productivity is higher in larger groups, our estimated increase in the number of physicians will be too low.

## Discussion

The expected increase in primary care utilization resulting from the PPACA's expansion of insurance has created new concerns about the number and geographic distribution of providers, as well as the ability of providers to deliver care to patients in a timely manner. It will be very difficult to meet the short-term and long-term needs for more primary care physicians simply through changes in medical school and graduate medical education policies. Instead, medical schools' admission policies will need to give priority to applicants with a strong underlying disposition toward primary care. In addition, medical educators will need to provide role models who support students who want to become primary care physicians. Finally, graduate medical education will need to offer rotations and experiences that reinforce the values of primary care and use funding support to promote a broad range of primary care opportunities. Some admirable examples (e.g., Jefferson Medical College; the University of California medical schools, which focus on addressing the needs of the underserved; and the Wisconsin Academy for Rural Medicine at the University of Wisconsin) have made changes in traditional medical education that support primary care. Despite these efforts, newly trained physicians are increasingly choosing nonprimary care specialties for their field of practice.

Policymakers might consider two other basic strategies to address this anticipated increase in primary care utilization. One set of strategies focuses on creating stronger financial incentives to attract medical school students to primary care. The PPACA includes several such provisions for primary care providers and other health care professionals. Past efforts by the federal government have mainly tried to reduce medical school debt through grants, scholarships, and loan repayment programs. Though important, there is little evidence to show that these programs have helped alleviate the shortage of primary care physicians. Moreover, in the current payment system, such incentives do not adequately address the larger and more significant imbalance of PCPs' lifetime earnings compared with those of specialists (Hackbarth 2010; Vaughn et al. 2009). Reforming the payment system to reward outcomes rather than volume might help, and tying payment to performance might reduce the provision of low-value services in primary care settings, thereby freeing up capacity for services with higher value.

A second set of strategies to address the increased use of primary care is changing those care delivery processes that could lead to operational improvements, higher throughput, and better quality. Examples are a greater use of nonphysician clinicians (NPCs), telemedicine, and team-based care. The literature suggests mixed evidence for the benefits of these strategies in the short term. For example, one recent meta-analysis concluded that the appropriate use of NPCs could improve the quality of care and patient outcomes but found mixed effects on costs dependent on context (Laurant et al. 2009). In addition, systematic reviews of the effectiveness of telemedicine have yielded inconsistent results (Ekeland, Bowes, and Flottorp 2010), and there is little empirical evidence regarding the impact of team-based care.

More recent comprehensive strategies for the redesign of care include the creation of medical homes and the formation of accountable care organizations. Results from demonstrations and evaluations of these and other innovations as specified by PPACA will be vital to determining whether redesigning care can improve efficiency and accommodate the increased demand for primary care resulting from the expansion of coverage in 2014.

## Endnote

1. The multivariate regression model can be expressed as follows:

$$\begin{aligned} Visits_{it} &= \alpha + X\beta + H\gamma + E\delta + \theta 1 ESI + \theta 2 Public + \theta 3 Mixed \\ &\quad + \theta 4 OtherPrivate + \theta 5 (Part - year\ uninsured) + \varepsilon_{it} \end{aligned}$$

The number of visits that an individual makes in a given year depends on his or her demographic characteristics ($X$), health status ($H$), economic factors ($E$), and a set of binary indicators for health insurance. Parameters are denoted by $\alpha$, $\beta$, $\gamma$, $\delta$, and $\theta 1$–$\theta 5$.

## References

Almeida, R., L.C. Dubay, and G. Ko. 2001. Access to Care and Use of Health Services by Low-Income Women. *Health Care Financing Review* 22(4):27–47.

American Community Survey. 2008. Available at http://www.census.gov/acs/www/ (accessed January 4, 2011).

Banthin, J., and T. Selden. 2003. The ABCs of Children's Health Care. *Inquiry* 40(2):133–45.

Bodenheimer, T., K. Grumbach, and R.A. Berenson. 2009. A Lifeline for Primary Care. *New England Journal of Medicine* 360(26):2693–96.

Bodenheimer, T., and H.H. Pham. 2010. Primary Care: Current Problems and Proposed Solutions. *Health Affairs* 29:799–805.

Buchmueller, T.C., K. Grumbach, R. Kronick, and J.G. Kahn. 2005. The Effect of Health Insurance on Medical Care Utilization and Implications for Insurance Expansion: A Review of Literature. *Medical Care Research and Review* 62:3–30.

Colwill, J., J. Cultice, and R. Kruse. 2008. Will Generalist Physician Supply Meet Demands of an Increasing and Aging Population? *Health Affairs* 27:w232–w241.

Dill, M., and E. Salsberg. 2008. *The Complexities of Physician Supply and Demand: Projections through 2025*. Association of American Medical Colleges, Center for Workforce Studies. Available at https://services.aamc.org/publications/index.cfm?fuseaction=Product.displayForm&prd_id=244&prv_id=299 (accessed January 4, 2011).

Ekeland, A., A. Bowes, and S. Flottorp. 2010. Effectiveness of Telemedicine: A Systematic Review of Reviews. *International Journal of Medical Informatics* 79:736–71.

Elmendorf, D. 2010. H.R. 4872, Reconciliation Act of 2010. Congressional Budget Office and Staff of the Joint Committee on Taxation. Available at http://www.cbo.gov/doc.cfm?index=11355&zzz=40566 (accessed January 4, 2011).

Ezzati-Rice, T., and F. Rohde. 2008. Statistical Brief 201: Variation in Ambulatory Health Care Visits and Visits for General Checkup by Demographic Characteristics and Insurance Status, U.S. Civilian Noninstitutionalized Population Ages 18–64, 2005. Available at http://www.meps.ahrq.gov (accessed January 4, 2011).

Hackbarth, G. 2010. *Aligning Incentives in Medicare*. Testimony before U.S. House Committee on Energy and Commerce, Subcommittee on Health, June 23.

Kashihara, D., and K. Carper. 2009. Statistical Brief 272: National Health Care Expenses in the U.S. Civilian Noninstitutionalized

Population, 2007. Available at http://www.meps.ahrq.gov (accessed January 4, 2011).

Laurant, M., M. Harsmen, H. Wollersheim, R. Grol, M. Faber, and B. Sibbald. 2009. The Impact of Nonphysician Clinicians: Do They Improve the Quality and Cost-Effectiveness of Health Care Services? *Medical Care Research and Review* 66(suppl. 6):36S–89S.

Lave, J., C. Keane, C. Lin, E. Ricci, G. Amersbach, and C. LaVallee. 1998. Impact of a Children's Health Insurance Program on Newly Enrolled Children. *JAMA* 279:1820–25.

Marquis, M.S., and S. Long. 1994/1995. The Uninsured Access Gap: Narrowing the Estimates. *Inquiry* 31(4):405–14.

MGMA (Medical Group Management Association). 2009. Data from Physician Compensation and Production Survey: 2009 Report. Englewood, CO.

Starfield, B., L. Shi, and J. Macinko. 2005. Contribution of Primary Care to Health Systems and Health. *The Milbank Quarterly* 83(3):457–502.

Vaughn, B., S. DeVrieze, S. Reed, and K. Schulman. 2009. Can We Close the Income and Wealth Gap between Specialists and Primary Care Physicians? *Health Affairs* 29(5):933–40.

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