

**Out-of-Pocket Health Care
Spending
And The Rural Underinsured**

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And The Rural Underinsured**

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EXECUTIVE SUMMARY

Multiple studies conducted over the past decade have documented lower rates of health insurance coverage among rural residents compared to their urban counterparts (Ziller et al., 2003; Eberhardt, Ingram & Makuc, 2001; Ormond, Zuckerman & Lhila, 2000; Pol, 2000; Schur & Franco, 1999). However, the extent to which rural individuals with private coverage are underinsured compared to those in urban areas has been largely unstudied. By “underinsured” we mean individuals with health insurance coverage, who nevertheless are burdened by the out-of-pocket costs of their medical care.

If rural residents are more likely to be underinsured, then estimates of the uninsured are likely to understate the actual financial access barriers faced by individuals living in rural areas. In addition to being an access concern for rural residents, the rate of underinsurance in rural areas has important implications for rural providers as well. If a substantial number of insured rural residents have policies with large deductibles or co-payments, some of this burden is likely to be shifted to providers in the form of bad debt or requests for charity care.

This study had two basic research objectives: 1) to identify whether and to what extent there are rural-urban differences in underinsured rates among the privately insured, and 2) where differences exist, to understand what characteristics of rural residents are related to their likelihood of being underinsured. Using the 2001 and 2002 Medical Expenditure Panel Survey (MEPS), we examined the annual out-of-pocket health care expenditures for U.S. residents under age 65 that were continuously insured by a private plan in either 2001 or 2002. Following the example of Schoen et al. (2005), we classified privately insured individuals as being underinsured if their total family out-of-pocket expenditures exceeded ten percent of family incomes; or, if the individuals’ family incomes were below 200% of the federal poverty level (FPL), if their family out-of-pocket costs exceeded five percent of family income. Categorizing individuals as underinsured based on their expenditure and access information, we then explored the characteristics associated with inadequate coverage for rural and urban residents.

Findings

Rural residents were significantly more likely to be underinsured and this likelihood increased as individuals moved from counties adjacent to an urban area to rural non-adjacent counties.

Among those privately insured with any health care expenditures in 2001 or 2002, 17% of rural non-adjacent residents had annual out-of-pocket expenses for their own care of \$1000 or more, compared to 13% and 14% of urban and adjacent residents respectively.

7% of urban residents were underinsured compared with 10% of rural adjacent and 12% of rural non-adjacent residents.

Family income as a percent of poverty had the most pronounced relationship to being underinsured. While only three percent of those living above 200% of FPL were underinsured, more than 60% of poor (below poverty) individuals lacked adequate coverage. This was particularly true for rural residents; in both adjacent and non-adjacent counties roughly 75% of the poor spent more than 5% of their incomes on family medical care compared to only 61% of the urban poor.

Self-reported health status and chronic conditions also related strongly to an individual's underinsurance status. Those in fair or poor health were almost three times as likely to be underinsured (19% versus 7%) for all rural-urban residences. Similarly, across all three geographic levels, those with a chronic condition were about 50% more likely to be underinsured, although rates remained highest among non-adjacent residents.

Both employer and job characteristics were associated with underinsurance, with some rural-urban differences.

Multivariate models revealed that rural residents were still significantly more likely to be underinsured even after controlling for socioeconomic and health care use characteristics. Only when plan features were added to the model did the rural non-adjacent variable cease to be significant.

Discussion and Policy Implications

Despite having private health insurance coverage, those who use medical services continue to pay for a substantial portion of their own health care costs, particularly those living in rural areas. The average rural non-adjacent individual paid for 39% of their care in 2001 or 2002, compared to 35% for rural adjacent and 32% for urban individuals. Given these disparities in mean out-of-pocket costs, it is not surprising that our analyses found that rural residents face a substantially higher likelihood of being underinsured than do urban residents, and that this disparity increases as proximity to urban areas decreases. While one out of every eight non-adjacent residents is underinsured (12.4%), only 10% of adjacent and 7% of urban residents are underinsured. Our multivariate findings suggest that the most important contributor to rural residents' underinsured status is the nature of private plans to which they have access, including whether or not the plan is an HMO or covers prescription drugs.

As health care costs continue to climb, a substantial number of employers intend to shift more premium costs to their employees, while a smaller number will offer plans with greater cost-sharing for medical care (Gabel et al., 2005). As a result, it is likely that the number of uninsured and underinsured individuals will increase. Given the generally lower incomes of rural residents, it is critical that rural health researchers and policymakers monitor the effect of changes in the private insurance market on those living in rural areas. Those concerned about the health care access issues facing uninsured rural residents should also be focusing their attention on the problem of underinsurance. Efforts to expand private coverage must take into account the impact that plan design and cost-sharing requirements have on family pocketbooks, and consequently medical service use, particularly in households where someone has a chronic illness or other health issue.

The elevated risk of being underinsured among rural residents has implications not only for patients but for providers. Given the higher proportion of underinsured in rural areas, and the fact that prior research has found that 46% of the underinsured are in collection for medical debts (Schoen et al., 2005), it means that rural providers have yet another financial hurdle to overcome—even when their patients have private health insurance. Thus, future studies should seek to measure the degree to which underinsurance is affecting both rural residents' access to health care, and rural providers' financial solvency.

INTRODUCTION

Multiple studies conducted over the past decade have documented lower rates of health insurance coverage among rural residents compared to their urban counterparts (Larson & Hill, 2005; Ziller et al., 2003; Eberhardt, Ingram & Makuc, 2001; Ormond, Zuckerman & Lhila, 2000; Pol, 2000; Schur & Franco, 1999). This rural-urban difference in coverage is attributed in large part to the fact that rural residents have more limited access to private employer-based coverage because they tend to work for smaller firms and earn lower wages than urban residents (Coburn, Kilbreth, Long, and Marquis, 1998). Despite some evidence that rural-urban differences in health insurance coverage rates may be declining, data continue to show that rural and urban residents have different types of coverage (Pol, 2000).

Although the health insurance status of rural residents has been studied repeatedly, the relative richness of coverage among those with private health insurance remains unclear. There have been limited analyses of the extent to which rural individuals with private coverage are underinsured compared to those in urban areas. By “underinsured” we mean individuals with health insurance coverage, who nevertheless are burdened by the out-of-pocket costs of their medical care. If rural residents are at greater risk of being underinsured, this has implications for access to care. As the well-known RAND health insurance experiments have demonstrated, the use of ambulatory care in particular is highly sensitive to the amount of cost-sharing that a consumer faces (Manning et al., 1988). Consequently, even among those with private health insurance, rural residents may face greater financial barriers to seeking health care services.

The purpose of this study was to estimate the underinsured rates among the privately insured in rural areas, and to determine whether and to what degree they differ from urban areas. In addition, we examined the characteristics associated with being underinsured and whether or not they differ for rural and urban residents. Finally, given any rural-urban differences in underinsured rates, we attempted to explain these differences by controlling for socioeconomic, utilization, and health plan characteristics.

BACKGROUND

There is a growing body of evidence that thinking about health insurance coverage as a dichotomous measure (insured versus uninsured) poses significant limitations for understanding health care access and policy issues. Recognizing this, researchers have shifted to thinking about insurance coverage as a continuum that is comprised of varying levels of adequacy (Donelan et al., 2000). As healthcare costs continue to rise, the insured face increased premiums, higher co-payments, and/or limitations on benefits. As a result, consumers face increasing risk and financial burden from their out-of-pocket healthcare expenses; in 2001, for example, 24% of insured families spent \$2,000 or more out-of-pocket for their medical care (Kaiser Commission on Medicaid and the Uninsured, 2002). Those who cannot afford these out-of-pocket costs may face essentially the same access to care problems as the uninsured such as ignoring necessary medical care and foregoing prescriptions, potentially putting their health in danger. In a study among insured Americans who had to postpone seeking medical care due to costs, 36% said it resulted in a temporary disability that caused significant pain and suffering, and 14% said it caused a long-term disability (Kaiser Commission on Medicaid and the Uninsured, 2002). In addition to the potential risk to patients, underinsurance threatens hospitals and physicians with patients who cannot pay their debts and who do not follow prescribed care (Farley, 1985).

One of the difficulties researchers have faced when assessing the adequacy of private health insurance coverage is how to define underinsurance (Donelan, 2000, Bashshur et al., 1993). Generally, researchers have used either economic or experiential measures. For example, Bashshur and colleagues (1993) defined underinsurance as one or more of the following situations: where a) too few services are covered or the coverage is inadequate; b) amounts of out-of-pocket expenditures, with or without regard to family income, are excessive; c) insurance is perceived to be inadequate; or d) some combination of these. While Bashshur maintains that it is appropriate at some level for the insured to have less than full coverage to avoid overuse of the healthcare system, he defines underinsurance in general terms as coverage that fails to provide adequate protection against health care expenditures. This failure in coverage can occur among those insured year-round, but who still face problems when paying for medical care. It also can occur among those who hold seasonal or part-time employment, or when workers are faced with short-term lapses in coverage due to waiting periods (Bashshur et al., 1993).

The first study to report underinsurance rates in the United States estimated that anywhere from 8% to 26% of non-elderly, privately insured individuals were underinsured in 1977 (Farley, 1985). These estimates were based on an economic definition, which defined underinsurance as a ratio of expected out-of-pocket expenses to annual income. Updating these findings in 1995, Short & Banthin found that 19% of the non-elderly insured population would be underinsured if faced with a catastrophic illness, based on the risk of large out-of-pocket expenditures--i.e., those exceeding 10% of family income. A recent cross-sectional survey of US adults estimated that about one-quarter of adults aged 19-64--approximately 45 million people--were underinsured for all or part of the year (Schoen et al., 2005). Here, the authors defined underinsurance as being insured all year but without adequate financial protection based on exposure to out-of-pocket costs that were high relative to incomes (i.e. expenditures greater than 10% of income, or for those earning below 200% of poverty, greater than 5% of income).

Another approach for assessing underinsurance is to gather information from the insured about actual problems they have encountered when paying medical bills, rather than calculating an economic measure. For example, in a 1994 survey, Blendon et al. found that three out of four Americans who reporting problems paying medical bills had some form of health insurance coverage. One-third of the non-elderly insured population who could not afford their medical bills also had problems paying basic housing and food costs, suggesting that expensive medical bills can affect an individual's ability to meet basic living expense. Data from the 1995 Behavioral Risk Factor Surveillance System (BRFSS) found that approximately 6.6% of people in the US were underinsured, defined as having health insurance, but failing to see a doctor because of costs (CDC, 1998). In a report commissioned by the Commonwealth Fund, researchers found that nearly 1 in 5 insured adults reported a time in the past year when they did not have enough money to cover medical bills, prescription drugs, or other healthcare costs and that 16% had been contacted by a collection agency about their medical bills (Donelan, et al., 2000). The report also found that about 10% of insured adults did not get needed medical care because of costs. These problems occurred most often among insured adults with low or modest incomes. The same survey found that 22% of insured respondents rated their health insurance as fair or poor (Donelan et al., 2000).

There are a number of reasons to suspect that rural residents may be underinsured compared to urban residents. First, people in rural areas are more likely to purchase their private

health insurance individually (Chollet & Kirk, 1998). Because of the expense associated with purchasing health insurance individually, there is a high likelihood that many enrollees are purchasing plans that provide primarily catastrophic coverage (U.S. General Accounting Office, 1998), particularly in rural areas where per capita income tends to be lower. In addition, rural residents are much less likely to obtain health insurance through an HMO or other managed care arrangement (Casey, 1999) where co-payments are often lower than in traditional indemnity plans. One study found that privately insured rural residents in Minnesota had fewer covered benefits and were more likely to have a deductible than urban residents (Hartley et al., 1994). Authors of a study conducted in Nebraska concluded that underinsurance seems to be driven primarily by economic factors, and that consequently, residents of rural counties are more likely to be underinsured than residents of urban counties (Comer and Mueller, 1992). Although limited in geographic scope, this research suggests that underinsurance may be a real problem among rural families.

If rural residents are more likely to be underinsured, then estimates of the uninsured are likely to understate the actual financial access barriers faced by individuals living in rural areas. Those with inadequate health insurance face many of the same problems that the uninsured face. Underinsured patients have difficulties gaining access to care and are often unable to meet daily living expenses when unexpected illnesses occur (Kaiser Commission on Medicaid and the Uninsured, 2002). They may also lack confidence and satisfaction in the medical care that they receive (Schoen et al., 2005).

In addition to being an access concern for rural residents, the rate of underinsurance in rural areas has important implications for rural providers as well. If a substantial number of insured rural residents have policies with large deductibles or co-payments, it is unlikely that many will be able to bear the entire out-of-pocket costs of their medical services. As a result, much of this burden may be shifted to providers in the form of bad debt or requests for charity care. Because the rural safety net is already overtaxed by high caseloads of publicly insured and uninsured residents, it is of critical policy importance to develop a better understanding of how rural underinsurance may be contributing to the financial challenges of rural providers. This is particularly true if proposed solutions to the health insurance coverage problem in the United States have the potential to increase the number of underinsured.

To provide policymakers with relevant information about the adequacy of private coverage among rural residents, we use the 2001 and 2002 Medical Expenditure Panel Survey (MEPS) to compare the annual out-of-pocket expenditures for privately insured rural and urban individuals. Based on these expenditures, we identify those that are underinsured using the definition recently put forth by Schoen et al. (2005), and identify the characteristics that are related to underinsurance. We selected this definition (described above) because it builds upon prior work that commonly used 10% of income as the threshold for classifying underinsurance, but also refines it to be more sensitive to the economic circumstances of lower income (below 200% FPL) families. Through this study we hope to assist policymakers and professionals that are concerned with rural health policy issues in recognizing the importance of viewing insurance coverage as a continuous, rather than dichotomous, phenomenon.

METHODS

This study had two basic research objectives: 1) to identify whether and to what extent there are rural-urban differences in underinsured rates, and 2) where differences exist, to understand what characteristics of rural residents are related to their likelihood of being underinsured. To address these objectives, we examined the annual out-of-pocket health care expenditures for U.S. residents under age 65 that were continuously insured by a private plan in either 2001 or 2002. Categorizing individuals as underinsured based on their family expenditures and access information, we then explored the characteristics associated with inadequate coverage for rural and urban residents.

Data

This study used data from the 2001 and 2002 Medical Expenditure Panel Survey (MEPS) to measure differences in underinsurance among rural and urban individuals under age 65. MEPS is an overlapping panel survey conducted by the Agency for Healthcare Research and Quality (AHRQ) to collect detailed information on health insurance, health status, health care use and expenditures, as well as other detailed socioeconomic information from a representative sample of the United States' population. We pooled the 2001 and 2002 panels from the MEPS Household Component (HC) to create a file of approximately 43,315 unique respondents under

age 65, of whom 23,314 (53.8% of unweighted sample) were privately insured for the entire year in which they were surveyed.¹

Selecting MEPS as our data source had both advantages and limitations for addressing our research questions. On the one hand, the careful sampling design and weighting methods of the MEPS survey contribute to the generalizability of the results to rural and urban areas and populations across the nation. In addition, few other data sources capture the depth and breadth of information that is available through the MEPS, particularly the detailed expenditure data upon which our underinsured definition depends. On the other hand, the MEPS HC lacks data on the specific features of insurance plans such as premiums, deductibles, and co-pay requirements. As will be discussed in greater detail below, this limitation makes it likely that our results underestimate the actual risk of underinsurance among U.S. individuals and households.

Variable Definition

Dependent Variable

Following the example of Schoen et al. (2005), we developed a measure of underinsurance as our dependent variable that is based on out-of-pocket expenditures and family income. Using Schoen and colleagues' model, we classified privately insured individuals as being underinsured if their total family out-of-pocket expenditures exceeded ten percent of family incomes; or, if the individuals' family incomes were below 200% of the federal poverty level (FPL), if their family out-of-pocket costs exceeded five percent of family income. Schoen et al. (2005) advocate for this lower threshold to identify underinsurance among lower income families based on prior research and policy concerns about the impact of health spending at this level. For example, the RAND experiment found reductions in health care use among lower-income families when cost-sharing reached the 5% threshold. Additionally, according to Schoen et al. (2005), the State Children's Health Insurance Program (SCHIP) requires that all cost-sharing imposed by states on participating families not exceed 5% of household income.

Unlike Schoen and colleagues, however, we were unable to include a third measure-- individuals and families whose deductibles were greater than five percent of family income. As noted earlier, deductible information is not available through the MEPS Household Component for 2001 and 2002. As a result of this data limitation, we do not capture those individuals who

¹ More detailed information on the MEPS can be found at: http://www.meps.ahrq.gov/Data_Public.htm

are at risk of having high out-of-pocket costs based on their plan design, but do not actually use enough services over the course of the year to meet our expenditure definitions. To partially address this limitation, we included as underinsured anyone continually covered by private insurance that reported delaying or foregoing care because of concerns about payment.

While this underinsurance definition limits our findings, it is unclear that it does so in any way that systematically biases the central analyses of whether or not underinsured rates differ by rural or urban residence. If bias does exist, it is likely to occur in the direction of minimizing rather than overstating rural-urban differences. As discussed in the background section, we know that rural residents are more likely to have individual or small group private coverage and therefore may be more likely to have higher deductibles (U.S. General Accounting Office, 1998). In addition, rural residents tend to have lower household incomes (Ziller et al., 2003). Thus, by limiting our analyses to actual expenditures we are more likely to underestimate rural than urban underinsurance. At the same time, Schoen et al. found that the deductible information yielded the smallest segment of the underinsured, representing less than half of either those with 10%, or those with 5%, of their income spent on medical care. So although this limitation is a concern, it does not substantially undermine the study design.

Independent Variables

Our principal independent variable in these analyses is rural or urban residence. There are multiple methods for defining rural and urban areas that are commonly used in analyzing national data (Ricketts, Johnson-Webb & Taylor, 1998). This study uses a modified version of the Rural-Urban Continuum Codes², where counties are classified as urban, rural but adjacent to an urban county, or rural and not adjacent to an urban county. Categorizing rural counties based on their proximity to an urban place has important implications for rural health research, as prior studies have shown that insurance coverage and access differ for rural adjacent versus non-adjacent residents (Larson & Hill, 2005; Ziller et al., 2003; Ormond, Zuckerman & Lhila, 2000; Schur & Franco, 1999).

In addition to rural or urban residence, we included a number of covariates in our analyses that were selected because prior research has found them to be associated with health insurance coverage in general, and/or inadequate private coverage. These covariates include

² For more information about the Rural-Urban Continuum Codes, see:
<http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/>

measures of family employment status, poverty status, age, census region, minority status, and health status. In addition, we create dichotomous measures of health care utilization including whether or not an individual had an emergency room visit, prescription drug use, or an inpatient hospital stay. Finally, we include nominal information about individuals' private plans such as whether or not they cover prescription drugs, are an HMO, use a preferred provider list, pay off-list providers, or if the survey respondent was covered by a non-group plan at any time during the survey year.

Analytic Strategy

To address our research questions, we use a multi-stage analytic approach employing bivariate and multivariate methods. We weighted the data using the person-level weights provided by AHRQ in order to correct for known bias in the sampling design, with strata and primary sampling unit data designed to permit pooling of survey years. All statistical tests were calculated using the clustering options available in SAS to account for the complicated design of the MEPS sample and to yield valid standard errors for the weighted data.³

Our bivariate analyses examine out of pocket spending and differing rates of underinsurance for rural and urban residents. In addition, we compare the sociodemographic and economic characteristics of the rural and urban underinsured to assist us in understanding any disparities and possible policy remedies. All frequency differences were evaluated with Rao-Scott chi square tests of significance to adjust for data clustering. For tests of significance between mean values, we constructed 95% confidence intervals around each mean and identify as statistically significant those values where the confidence intervals do not overlap. Unless stated otherwise, any differences reported in the text of this paper are statistically significant at the .05 level or less.

Finally, to understand what factors are associated with being underinsured, and whether rural-urban differences could be adequately explained by these factors, we developed a series of logistic regression models designed to predict rural underinsured rates controlling first for socioeconomic, then also utilization, and finally insurance plan characteristics.

³ More detail about the options for analyzing clustered data in SAS are available at www.sas.com

FINDINGS

Out-of-Pocket Expenditures

Among those privately insured with any health care expenditures in 2001 or 2002, 17% of rural non-adjacent residents had annual out-of-pocket expenses for their own care of \$1000 or more, compared to 13% and 14% of urban and adjacent residents respectively ($p \leq .001$; data not shown). The total out-of-pocket costs did not differ between rural adjacent and urban residents; however, rural non-adjacent residents spent more than \$100 more than both urban and adjacent residents in mean out-of-pocket dollars (Table 1). As a result, while urban residents were responsible for 32% of their total costs, those rural residents not adjacent to urban areas covered 39% of their own total expenses.

Rural-urban differences in out of pocket spending are not due to differences in health care use. For office-based visits, neither the mean number of visits nor the mean actual out-of-pocket costs differed significantly by residence. However, as with total expenditures, the proportion of the costs borne directly by non-adjacent rural residents was markedly higher than for urban residents (34% versus 25%). In this case, rural adjacent residents also differed significantly from those in urban areas, paying 28% of the costs associated with their office-based care.

Although neither the likelihood of having an inpatient visit, nor the number of days spent in the hospital differed significantly by residence, those living in counties not adjacent to urban areas faced about double the out-of-pocket costs for hospital care both in raw dollars (\$382 versus \$192) and as a proportion of expenditures (10% versus 6%). Similarly, while residents from both rural designations did not differ significantly from urban residents on the mean annual amount spent on ER care, or their mean out-of-pocket costs, rural ER patients paid for a higher proportion of their care than urban patients did. While urban residents paid, on average, about 14% of their total ER costs, rural residents paid 21% of these costs regardless of their proximity to an urban area ($p \leq .05$).

For prescription drug use, both utilization and costs were higher among non-adjacent individuals compared to those in urban areas. Sixty-nine percent of non-adjacent respondents had a prescription filled, for a mean of 11 prescriptions over the course of their survey year; this compares to 66% of urban residents and a mean of 10 prescriptions annually. Average out-of-pocket costs for prescription drugs were more than half of total medication costs (51%) for rural non-adjacent residents compared to 47% for urban residents.

Table 1: Average Annual Out-of-Pocket Costs for Privately Insured non-Elderly, by Service and Rural-Urban Residence (n = 23,314)

CHARACTERISTIC	Total	Urban	Rural Adjacent	Rural Non-Adjacent
	Mean Cost (In Dollars or Proportion of Costs)			
Total out-of-pocket	\$520.35	\$512.44	\$516.21	\$617.57*
% Out-of-pocket	33.0%	32.3%	34.7%*	38.8%*
Office-based Visits				
Number of Visits	6.2	6.2	6.1	5.9
Total out-of-pocket	\$153.42	\$153.38	\$130.76	\$186.03
% Out-of-pocket	26.2%	25.2%	28.8%*	34.0%*
Inpatient Visits				
% With an inpatient stay	5.5%	5.3%	7.4%	6.3%
Number of inpatient days	5.0 days	5.7 days	4.9 days	4.9 days
Total out-of-pocket	\$200.57	\$192.17	\$140.29	\$382.08*
% Out-of-pocket	5.8%	5.7%	4.3%	9.6%*
Emergency Room				
% With an ER visit	11.7 %	11.5	14.1	11.3
Total out-of-pocket	\$53.64	\$51.09	\$62.83	\$67.92
% Out-of-pocket	15.2 %	13.9%	20.8%*	20.7%*
Prescription Drugs				
% With a prescription use	66.7	65.9	69.7*	68.9*
Number of prescriptions	10.9	10.3	11.1*	11.1*
Total out-of-pocket	\$211.61	\$202.42	\$241.91	\$271.13*
% Out-of-pocket	47.6%	47.2%	48.2%	50.8%*

SOURCE: Medical Expenditure Panel Survey, Agency for HealthCare Research and Quality, Pooled 2001 and 2002 Household Component Files.

NOTE: Out-of-pocket cost includes the amount paid for medical services by an individual or his or her family.

Privately insured includes those individuals that are continuously insured by a private health plan during 2001/2002.

*Statistically significant compared to urban at $p \leq .05$

Underinsured Rates

Unlike the out-of-pocket costs discussed in the previous section that are based on individuals' expenditures, the following sections describe aggregate family costs for all those with private insurance continuously for a year. Relying only on individual expenditures would lead to an underestimate of the degree to which family resources were being spent on medical care. Moreover, using only an individual's income could lead to an overestimate of underinsurance if the individual had limited personal income (i.e. a non-working spouse) but could draw on the much greater resources of other family members for their medical expenses.

Based on the definitions discussed above, 7.6% of all individuals were underinsured in 2001 or 2002. As expected, this was lower than the estimated rate of 12.3% produced by Schoen et al. (2005); a substantial part of this difference appears to be based on differences found in the

ratios of total out-of-pockets costs to family incomes. For example, Schoen and her colleagues found that 7.1% and 7.8% of individuals had personal expenses more than 10%, or 5% for those with lower incomes, compared to our findings of 5.0% and 4.6% respectively. This variation is undoubtedly driven by several key differences between the two studies. First, while our study is limited to only those with private health insurance coverage, Schoen et al. (2005) include those with public coverage in their analyses. In particular, the inclusion of the under age 65 Medicare-eligibles is likely to yield a higher underinsurance estimate because this group often has lower income and higher medical needs. Additionally, since the most recently available MEPS panels were fielded in 2001 and 2002, versus the Commonwealth Biennial Survey in 2003, there may be some temporal factors at work. This is supported by the fact that the number of high deductible plans was increasing during this time period (Gabel et al., 2005), meaning that the actual number of underinsured would likely also have been increasing.

Also as anticipated, we found that underinsured rates differed as residence became more rural. While just fewer than 7% of urban residents were underinsured by our definition, the rate increased to 10% for rural adjacent and 12% for rural non-adjacent residents. This pattern was essentially the same whether one considered those spending more than 10% of their income on medical care, or spending 5% for those with incomes below 200% FPL. The number of continuously insured individuals reporting that they had delayed or foregone medical care due to cost was lower than expected (1%), and differed dramatically from results found by other surveys such as the BRFSS (6.6%; CDC, 1998). Because of small numbers, this indicator could not be compared for rural and urban residents.

Underinsured Rates and Socioeconomic Characteristics

Underinsured rates for each level of geography, by socioeconomic, employment, or plan characteristic, are presented in Tables 2 through 4. For every table we have calculated chi square statistics to evaluate the rural-urban differences for each characteristic (i.e. to see if the rural poor were more or less likely to be underinsured than the urban poor). In addition, for each residence category we used chi square tests to determine if each characteristic was statistically associated with differences in underinsured rates. Each of the characteristics was significantly related to being underinsured regardless of residence. In addition, underinsurance differed by residence regardless of the characteristic explored, although in some cases these differences were small (although statistically significant).

Rural-urban differences in being underinsured persisted across all geographic regions, although the patterns differed slightly (Table 2). For example, while non-adjacent underinsured rates were essentially double those of urban residents in the Northeast, Midwest and West, in the South they were only about 60% higher. And, while rural adjacent rates tended to be lower than non-adjacent rates, we found that rates in the West were significantly higher for those living adjacent to an urban area compared to more remote living individuals (14% versus 10%).

Compared to young adults (18-39), both children and those aged 40-64 were about twice as likely to be underinsured, across all three geographic levels. Family work status accounted for large differences in underinsured rates, with nearly half of those individuals living in households with no full-time workers being underinsured. Among those without two full-time workers, adjacent counties were the most disadvantaged.

As one would expect for a dependent variable constructed on economic measures, family income as a percent of poverty had the most pronounced relationship to being underinsured. While only 3% of those living above 200% of FPL were underinsured, more than 60% of poor (below poverty) individuals lacked adequate coverage. This was particularly true for rural residents; in both adjacent and non-adjacent counties roughly 75% of the poor spent more than 5% of their incomes on family medical care compared to only 61% of the urban poor.

Differences in underinsurance based on family size were generally quite small, with those in families of 3-4 members having somewhat less risk of being underinsured across all three levels of geography. Similarly, the underinsured rates for racial and ethnic minorities differed by only 1 or 2 percentage points for each residence type with White, non-Hispanic individuals having slightly greater likelihood of being underinsured.

Also as one might expect, self-reported health status and chronic conditions each related strongly to an individual's underinsurance status. Those in fair or poor health were almost three times as likely to be underinsured (19% versus 7%) for all rural-urban residence types. Similarly, across all three geographic levels, those with a chronic condition were about 50% more likely to be underinsured, with rates being highest in non-adjacent areas.

Among non-elderly adults, education was associated with being underinsured. In general, those with a college degree were half as likely to be underinsured as those without a high school diploma (5.3% versus 10.5%). However, this difference was proportionally less pronounced in rural non-adjacent areas (9.2% versus 15.3%). Although statistically significant,

the relationship between marital status and underinsurance is small and mixed, with married individuals having a somewhat greater underinsured rate in rural adjacent areas, but slightly lower rates than unmarried individuals in urban and non-adjacent counties.

Being female increases the risk of being underinsured regardless of residence, with women having about a 40% greater risk of inadequate private coverage. As one would expect, individual employment status had a strong relationship to being underinsured (although not as dramatic as family-level employment status). Only 5% of those currently working were underinsured compared to 20% of those that were unemployed or out of the labor force (OLF)—a four-fold difference. This difference became less dramatic among rural non-adjacent residents, with non-working adults being only three times more likely to lack adequate coverage (26% versus 9%).

Worker Characteristics

Among non-elderly adult workers, we found both employer and job characteristics are associated with underinsurance, with some rural-urban differences (Table 3). For example, while the self-employed had higher underinsured rates than those working for a firm (7% versus 5%), differences among urban workers were minimal (5.5% versus 4.1%). Among rural adjacent workers, this gap widened to 11% for the self-employed compared to 6% for the employed. The relationship was most dramatic among rural non-adjacent workers, with 16% of the self-employed being underinsured compared to 8% of those working as an employee.

Business size had a substantial and consistent relationship to underinsurance across the three residence levels, with those employed by small business (less than 20 employees) being almost twice as likely to be underinsured as were workers in larger businesses (7% versus 4%). The same is true for those working part-time versus full-time (again a 7% versus 4% underinsured rate), although the magnitude of the difference was lower for non-adjacent residents, and lowest for the rural adjacent. As with family income, underinsured rates differ by hourly wage, particularly in rural areas where those earning less than \$10 per hour were about two-and-a-half times more likely to be underinsured compared to those earning higher wages (11% versus 4.5% for adjacent; 12% versus 5% for non-adjacent).

Table 2: Percent Underinsured, by Characteristic and Rural-Urban Residence

CHARACTERISTIC	Total	Urban	Rural Adjacent	Rural Non-Adjacent
	Percent Underinsured			
<i>All Nonelderly (n = 23,314)</i>	7.6%	6.8%	10.4%	12.4%
Region***				
Northeast	6.1	5.9	7.2	11.1
Midwest	8.0	6.8	10.3	13.6
South	9.1	8.4	11.0	13.2
West	6.2	5.4	14.3	9.9
Age***				
<18	9.0	8.0	13.4	14.3
18-39	5.0	4.7	6.0	8.3
40-64	8.6	7.7	11.7	14.2
Family Work Status***				
No full-time workers	47.6	46.9	54.0	47.5
One full-time worker	12.4	11.0	21.2	20.2
Two full-time workers	6.5	5.6	9.9	12.0
Income as % of FPL***				
<100% FPL	63.7	61.0	75.4	73.3
100-199 FPL	30.8	28.4	37.6	38.1
200% FPL or greater	3.3	3.1	3.5	5.5
Family Size***				
1 person	8.6	8.3	10.2	13.2
2	8.5	7.5	11.2	15.2
3-4	6.2	5.7	7.2	10.5
5 or more	8.8	7.5	17.1	12.6
Minority Status***				
Racial/ethnic minority	6.3	6.0	11.0	10.3
White, non-Hispanic	7.9	7.1	10.4	12.7
Health Status***				
Good or better	6.8	6.1	9.3	10.9
Fair/Poor	18.6	16.3	24.0	32.6
Chronic Condition***				
Has a condition	10.0	9.0	13.1	15.5
No condition	6.6	5.9	9.2	10.9
<i>Adults (n = 16,407)</i>				
Education***				
Less than high school	10.5	9.2	14.5	15.3
High school/GED	7.9	7.2	9.6	12.4
College	5.3	5.0	7.2	9.2
Marital Status***				
Married	7.1	6.2	10.0	11.9
Not Married	6.9	6.6	7.8	11.3
Sex***				
Male	5.8	5.2	8.2	9.6
Female	8.2	7.4	10.6	13.9
Employment Status***				
Working	4.9	4.4	6.7	9.0
Unemployed or Out of Labor Force	19.7	18.3	25.1	26.1

SOURCE: Medical Expenditure Panel Survey, Agency for HealthCare Research and Quality, Pooled 2001 and 2002 Household Component Files. ***Chi square tests of rural-urban differences across characteristics, and differences in underinsured rates by characteristic within each geographic level, are significant at the $p \leq .001$ level.

Table 3: Percent of Workers Underinsured, by Job Characteristic and Rural-Urban Residence (n = 14,239)

CHARACTERISTIC	Total	Urban	Rural Adjacent	Rural Non-Adjacent
	Percent Underinsured			
Employee Status***				
Employed	4.7%	4.1%	6.3%	7.9%
Self-employed	7.1	5.5	10.9	16.1
Business Size***				
<20 employees	7.0	6.0	9.8	11.8
20+ employees	4.0	3.7	5.2	6.5
Hours Worked***				
Full-time (40+ hours)	4.2	3.6	6.3	7.9
Part-time (< 40 hours)	6.9	6.7	8.3	12.7
Hourly Wage***				
< \$10 per hour	8.7	7.7	10.8	12.4
\$10 per hour or more	3.6	3.4	4.5	5.4

SOURCE: Medical Expenditure Panel Survey, Agency for HealthCare Research and Quality, Pooled 2001 and 2002 Household Component Files.

***Chi square tests of rural-urban differences across characteristics, and differences in underinsured rates by characteristic within each geographic level, are significant at the $p \leq .001$ level

For our final bivariate comparisons we considered the relationship between insurance plan features and underinsured rates (Table 4). First, as we anticipated, being underinsured was a greater problem for those whose private insurance included at least one month of non-group coverage over the course of the year (14% underinsured versus 7% underinsured). This difference was slightly less pronounced for rural non-adjacent residents, for whom having non-group coverage represented a 1.4 times increase in being underinsured versus the 2-fold difference experienced by adjacent and urban residents. Being covered by an HMO plan had some protective effect against being underinsured, particularly for those in rural adjacent areas where the underinsured rate was 8% for those in HMO plans versus 12% for non-HMO plans. Whether or not the plan had a preferred provider list had limited and mixed associations with underinsurance, with urban and adjacent underinsured rates being slightly higher for those with a doctor list compared to a slightly lower rate for non-adjacent residents (10% versus 12%).

As one would expect, individuals that reported having a choice of health plans through their employers were less likely to experience underinsurance (3% versus 5.5%); this pattern was consistent throughout the three geographic levels. Of the plan features analyzed, however, the strongest relationship to being underinsured was found for plans that did not cover prescription

drugs (16% versus 7%). This was most pronounced for individuals in non-adjacent areas, for whom lack of prescription drug coverage was associated with underinsured rates of 28% versus only 10% for those whose plan covered prescriptions.

Table 4: Percent Underinsured by Plan Characteristics and Rural-Urban Residence (n = 23,153)

CHARACTERISTIC	Total	Urban	Rural Adjacent	Rural Non-Adjacent
	Percent Underinsured			
Ever had nongroup plan?***				
Yes	14.1%	13.0 %	19.6 %	17.3%
No	7.3	6.5	10.1	12.1
Is current plan an HMO?***				
Yes	6.2	5.8	8.0	11.2
No	8.6	7.5	12.3	12.4
Plan has doctor list?***				
Yes	7.7	6.9	12.1	10.3
No	7.2	6.5	10.1	12.3
Plan covers prescriptions?***				
Yes	6.8	6.2	10.0	10.2
No	16.0	14.4	15.0	27.9
Choice of Health plan?***^a				
Yes	3.3	3.1	4.0	4.7
No	5.5	4.8	7.6	8.5

SOURCE: Medical Expenditure Panel Survey, Agency for HealthCare Research and Quality, Pooled 2001 and 2002 Household Component Files.

^aAmong those with employer-sponsored plans.

***Chi square tests of rural-urban differences across characteristics, and differences in underinsured rates by characteristic within each geographic level, are significant at the $p \leq .001$ level.

Logistic Regression

As discussed in the methodology section, we completed our logistic regression analyses in three Logit models. First, we included basic socioeconomic control variables, then utilization variables, and finally health plan characteristics in the third model. The results for each of the models are presented in Table 5. In order to include children in the model, we omitted socioeconomic variables such as education and marital status. While the former was an important explanatory variable at the bivariate level it is also highly correlated with income; marital status, on the other hand, was not an important variable at the bivariate level.

When socioeconomic characteristics were included in our model, we found that the underinsured rate for rural adjacent residents ceased to differ significantly from that of urban

residents. For non-adjacent residents, however, the risk of being underinsured persisted even after controlling for these individual and family measures with an OR of 1.66, meaning that the odds of being underinsured were 66% higher for non-adjacent than urban residents. Similarly, even after we added dichotomous utilization measures of prescription drug, inpatient and emergency room use to the model, rural non-adjacent residents remained 65% more likely than urban residents to be underinsured. Only when plan features were added to the model did the rural non-adjacent variable cease to be significant.

As with the bivariate results, our regression analyses indicate that both children and older adults had significantly greater odds of being underinsured when compared to 18 to 39 year olds (OR: 1.92 and 1.89 respectively). Similarly, family employment status and income were both strongly associated with underinsurance; compared to those living below the poverty level, for example, those with incomes above 200% FPL were 97% less likely to be underinsured (OR: 0.03). Being a member of a racial or ethnic minority group was related to a lower risk of being underinsured, while having a chronic condition or poorer health status increased the odds of being underinsured.

As expected, each of the three measures of utilization were significantly associated with the likelihood of being underinsured as each had the potential to be a high cost event. Those taking prescription medication during the survey year were nearly 75% more likely to be underinsured than those without medication use (OR: 1.73). Similarly, those with an inpatient stay had a 72% higher risk of being underinsured, and ER users a 36% higher risk.

We fit several different models to include each of the plan features shown in Table 4; regardless of the combination of variables about plans that we used, the rural non-adjacent indicator ceased to be significantly associated with underinsurance. To avoid issues of multicollinearity, we opted to retain only some of the plan features, including whether or not the plan covered prescription drugs, was an HMO, and whether the person had ever been covered by a nongroup plan. Both HMO-covered individuals, and those with drug coverage, had lower underinsured rates than those without these plan features. Although highly significant at the bivariate level, having nongroup coverage at some point during the year was not related to underinsurance when controlling for other factors.

Table 5: Odds of Being Underinsured among Rural and Urban Non-Elderly, Controlling for Socioeconomic, Utilization and Health Plan Characteristics

Characteristic (Referent)	Model 1: Socioeconomic Controls		Model 2: Socioeconomic and Utilization Controls		Model 3: Socioeconomic, Utilization and Plan Design Controls	
	Odds-Ratio	95% CI	Odds-Ratio	95% CI	Odds-Ratio	95% CI
Rurality (Urban)						
Rural Adjacent	1.32	0.96-1.82	1.29	0.94-1.79	1.27	0.92-1.76
Rural, non-Adjacent	1.66*	1.20-2.29	1.65*	1.20-2.27	1.47	1.00-2.04
Region (Northeast)						
Midwest	1.53*	1.07-2.19	1.52*	1.06-2.18	1.44	0.99-2.09
South	1.48*	1.11-1.99	1.49*	1.11-1.99	1.42*	1.05-1.93
West	1.04	0.73-1.48	1.07	0.75-1.52	1.07	0.75-1.52
Age (18-39)						
Less than 18	1.92***	1.64-2.25	2.05***	1.75-2.39	2.08***	1.78-2.43
40-64	1.89***	1.52-2.28	1.93***	1.60-2.31	1.92***	1.60-2.31
Income (< 100% FPL)						
100-200% FPL	0.33***	0.23-0.47	0.32***	0.22-0.46	0.31***	0.22-0.44
200% FPL or more	0.03***	0.02-0.04	0.03***	0.02-0.04	0.03***	0.02-0.04
Family Employment (2 FT Workers)						
No Workers	14.05***	9.62-20.5	14.69***	9.95-21.69	13.2***	9.02-19.3
Part-time Workers	3.14**	2.05-4.80	3.19***	2.09-4.87	3.03***	1.99-4.61
1 Full-time Worker	2.06***	1.51-2.82	2.07***	1.51-2.83	2.04***	1.49-2.79
Family Size (5 or More)						
1 Member	0.65**	0.45-0.96	0.62**	0.42-0.90	0.59**	0.41-0.87
2 Members	0.88	0.62-1.26	0.82	0.58-1.17	0.83	0.58-1.19
3-4 Members	0.99	0.71-1.37	0.93	0.68-1.29	0.93	0.68-1.29
Minority Status (White, non-Hispanic)						
Racial/Ethnic minority	0.51***	0.41-0.63	0.52***	0.42-0.64	0.52***	0.42-0.65
Health Status (Good to Excellent)						
Fair/Poor	2.27***	1.83-2.82	1.93***	1.55-2.42	1.95***	1.57-2.43
Chronic Condition (None)						
Has a condition	1.30*	1.10-1.53	1.11	0.93-1.32	1.12	0.94-1.33
Any Prescription Use (None)	--	--	1.73***	1.44-2.07	1.80***	1.50-2.16
Any Inpatient Use (None)	--	--	1.72***	1.36-2.18	1.71***	1.35-2.16
Any ER Use (None)	--	--	1.36**	1.12-1.65	1.36**	1.12-1.66
HMO Plan (No)	--	--	--	--	0.78*	0.61-1.00
Plan Covers RX (No)	--	--	--	--	0.62**	.046-0.83
Ever Had Nongroup Coverage (No)	--	--	--	--	1.30	0.89-1.89

SOURCE: Medical Expenditure Panel Survey, Agency for HealthCare Research and Quality, Pooled 2001 and 2002 Household Component Files.

NOTE: *p ≤ .05 **p ≤ .01 ***p ≤ .001

DISCUSSION AND POLICY IMPLICATIONS

Despite having private health insurance coverage, those who use medical services continue to pay for a substantial portion of their own health care costs, particularly those living in rural areas. The average rural non-adjacent individual paid for 39% of their care in 2001 or 2002, compared to 35% for rural adjacent and 32% for urban individuals. This pattern was true regardless of service type with the exception of inpatient care, for which rural adjacent residents pay the lowest proportion of total costs (4%); however, rural non-adjacent residents paid, on average, 10% of their inpatient hospital costs compared to urban residents who paid an average of only 6%.

Given these disparities in mean out-of-pocket costs, it is not surprising that our analyses found that rural residents face a substantially greater likelihood of being underinsured than do urban residents, and that this disparity increases as proximity to urban areas decreases. While one out of every eight non-adjacent residents is underinsured (12.4%), this compares to 10% of adjacent and 7% of urban residents. And, despite controlling for a number of statistically significant socioeconomic and utilization characteristics in our logistic regression models, non-adjacent residents remained 65% more likely than urban residents to be underinsured. Only when plan characteristics are included, does the risk of being underinsured cease to be elevated for those not adjacent to an urban area. This suggests that the most important contributor to rural residents' underinsured status is the nature of private plans to which they have access.

Substantial policy attention has been paid to the adequacy of prescription drug coverage among rural seniors in light of Medicare Part D. However, less emphasis has been placed on access to prescription drugs for non-elderly rural residents. Our findings indicate that drug coverage is an issue for many rural residents, particularly those in non-adjacent areas, and may be a key source of underinsurance. Among all privately insured non-elderly residents of non-adjacent areas, the average annual amount spent out-of-pocket for medication was \$271, compared to \$202 among comparable urban residents. Not surprisingly therefore, we further find that over one-fourth (28%) of rural non-adjacent residents who had continuous private insurance coverage but lacked a prescription benefit were underinsured in 2001 or 2002. This contrasts dramatically with urban residents who have prescription coverage, of whom only 6%

were underinsured. The impact of prescription drug coverage remained statistically significant in our regression model, accounting for a 40% decrease in the odds of being underinsured.

Differences in our estimates of the underinsured compared to other studies warrants discussion. Given the lack of deductible information, we anticipated some of the difference between our findings and those of Schoen et al. (2005). And, as discussed earlier, our study design was sufficiently different from this prior work (both temporally and in our focus on the privately insured) that differences were to be expected even for the measures involving actual expenditures. Additionally, the Commonwealth Biennial Survey includes all health care service types (including dental care) in their expenditure data, while we limit our inquiry to those services more typically covered by private health insurance plans (ambulatory care, inpatient services, prescription drugs and mental health services).

Despite these possible explanations for differences between our estimates and those of previous research, it is likely that we underestimate the actual underinsured rate in the United States. Without access to detailed health plan information, it is impossible to tell which individuals might be inadequately covered if they were to develop an acute or chronic condition that required substantial medical expenditures. And, if rural residents are more likely to have plans with higher deductibles and/or co-payment for services, then it is possible that our findings understate the magnitude of difference in rates of underinsurance between rural and urban residents.

This study suggests that policymakers concerned about the health care access issues facing uninsured rural residents should also be focusing their attention on the problem of underinsurance. As noted by Schoen et al. (2005), individuals that are underinsured face barriers to care comparable to those of the uninsured, including: delaying care, lack of confidence in the quality of their health care, and facing debt collection as a result of medical bills. Thus, the fact that privately insured rural residents are at heightened risk of inadequate coverage means that many may be facing serious barriers to care. Certainly efforts to expand private coverage must take into account the impact that plan design and cost-sharing requirements have on family pocketbooks, and consequently medical service use, particularly in households where someone has a chronic illness or other health issue.

As noted in our background discussion, being underinsured has implications not only for patients but for providers. Given the high public payer and uninsured patient base of many rural

health providers, the rural health care infrastructure faces a number of challenges to financial solvency. Combined with the higher proportion of underinsured in rural areas, and the fact that prior research has found that 46% of the underinsured are in collection for medical debts (Schoen et al., 2005), it means that rural providers have yet another hurdle to overcome—even when their patients have private health insurance.

As health care costs continue to climb, a substantial number of employers intend to shift more premium costs to their employees, while a smaller number will offer plans with greater cost-sharing for medical care (Gabel et al., 2005). As a result, it is likely that the number of uninsured and underinsured individuals will increase. Given the generally lower incomes of rural residents, it is critical that rural health researchers and policymakers monitor the effect of changes in the private insurance market on those living in rural areas. In particular, future studies should seek to measure the degree to which underinsurance is affecting rural residents' access to health care, and rural providers' financial solvency.

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