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PREVENTIVE HEALTH EXAMINATIONS: A COMPARISON ALONG THE RURAL–URBAN CONTINUUM

Sharon Larson, PhD[a]*, and Rosaly Correa-de-Araujo, MD, MSc, PhD[b]

[a]*Substance Abuse and Mental Health Services Administration, Rockville, Maryland*
[b]*Agency for Healthcare Research and Quality, Rockville, Maryland*

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In this analysis, Medical Expenditure Panel Survey data from 2000 were used to examine differences in reports of preventive health service utilization in 4 types of counties: large metropolitan counties, small metropolitan counties, counties adjacent to metropolitan places, and counties not adjacent to metropolitan areas or with fewer than 10,000 residents. Women from counties with 10,000 or fewer residents and not adjacent to a metropolitan county, classified as *rural residents,* were less likely to report a number of preventive health examinations during the previous 2 years. Rural women were less likely to obtain blood cholesterol tests, dental exams, and mammograms during the previous 2 years when compared to women from large metropolitan counties. Rural women were more likely to obtain blood pressure checks during the previous year when compared to the metropolitan women. Findings for exams that occurred during the preceding 1- and 2-year periods are reported for blood pressure checks, blood cholesterol checks, physical exams, colon cancer screening, dental exams, breast exams, mammograms, and Pap smears.

There is some evidence that there is differential use and/or access to preventive health exams by some subpopulations. Conditions such as heart disease, hypertension, stroke, and many forms of cancer may now be identified early in the disease progression. Early detection has been linked with decreased mortality and disability associated with many conditions. The United States Preventive Service Task Force (USPSTF) (2001, 2002a, 2002b, 2003a, 2003b) has identified clear evidence that the health of women can be improved through preventive health screening.

Low income, low educational attainment, being uninsured, and generally having poor access to health care are all associated with a decreased likelihood of obtaining preventive health examinations (Salganicoff, Beckerman, Wyn, & Ojeda, 2002). The picture is somewhat complicated for rural residents because they, on average, have lower income and less education, and are more likely to be uninsured when compared to urban residents (Ricketts, Johnson-Webb, & Randolph, 1999; Schur & Franco, 1999). Rural residents also face structural barriers, including a finding that they are more likely to travel long distances to obtain health care than their urban counterparts (Schur & Franco, 1999) and are more likely to report having a usual source of care but are less likely to have a local physician and hospital (Ricketts et al., 1999). Rural residents also report significantly fewer health care visits each year (Larson & Fleishman 2003). Fewer visits to a health care provider may reduce opportunities for health care providers to recommend preventive care, because preventive health services are more likely to occur when recommended by a regular health care provider (Mayne & Earp, 2003). Rural women may be at a particular disadvantage in the use of preventive health services because they are, on average, older, poorer, and more likely to experience chronic illness and disability (Hughes Gaston, 2001), all characteristics associated with underutilization of preventive health services.

The picture is further complicated by lack of a common understanding of what constitutes rural. A large body of rural research relies on a dichotomous indicator that differentiates residents of metropolitan

* Correspondence to: Sharon Larson, PhD, Office of Applied Studies, Substance Abuse and Mental Health Services Administration, One Choke Cherry Road, Room 7-1010, Rockville, MD 20850.
E-mail: sharon.larson@samhsa.hhs.gov

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(MSA) settings from those who reside in nonmetropolitan (non-MSA)settings. This may be problematic; residents of non-MSA places may not be homogeneous in their demographic makeup or in the availability of health care and other resources. Non-MSA counties typically include residents of counties residing near large metropolitan places as well as those who reside in the most remote places in the United States. Differences within non-MSA residents have been identified in health service utilization when using more categories to define the non-MSA population (Larson & Fleishman, 2003). An additional limitation of some prior studies contrasting health care delivery in rural and urban areas is that the data come from a single state or region (Mueller, Patil & Ulrich 1997; Comer & Mueller 1995). Although local and regional studies do provide important data, national data can clarify whether local rural–urban disparities generalize to the national level. One recent study, using USPSTF recommendations in a comparison of men and women across 3 types of counties, found a significantly lower proportion of women from rural nonadjacent counties had fecal occult blood tests (FOBTs), sigmoidoscopic exams, mammograms, and Pap smears when compared to urban women (Casey, Thiede Call, & Klinger, 2001). Proportionately fewer rural men had appropriate exams as well when compared to urban men and women.

This paper provides revised and updated information about preventive health services utilization by women along the rural–urban continuum. MSAs and non-MSAs are each dichotomized to capture some of the differences that might be present between residential settings that are more heterogeneous with respect to population characteristics. This analysis examines differences between women from rural, urban, and small metropolitan counties and women from large MSAs in the likelihood of reporting use of preventive health exams during the previous 1 and/or 2 years, after controlling for underlying demographic characteristics. The specific group of interest is the most rural women, residing in non-MSA counties with less dense population centers.

Methods

Data come from the Medical Expenditure Panel Survey (MEPS), sponsored by the Agency for Healthcare Research and Quality. MEPS is a nationally representative survey of health care utilization and expenditures for the civilian noninstitutionalized population. The MEPS national probability sample includes persons from all regions of the United States and from metropolitan, urban, and rural areas. A new MEPS cohort is initiated each year and provides information for a 2-year reporting period. Over this period, MEPS conducts 5 in-person interviews with 1 or more persons from the household who report on health care utilization, insurance coverage, and medical conditions for each household member. Full-year data from 2000 were used for this analysis.

The full-year 2000 MEPS consists of 25,096 people. Our sample is limited to women ≥18 years during the year and includes 9,358 adult women for whom geographic data and response to key variables were available. Mammograms are recommended for women 40 years of age and older and colon cancer screenings are recommended for adults 50 years and older; the sample for analyses of these examinations is limited to reflect these recommendations. Women who did not provide a response for a particular examination were not excluded from other exam analyses.

Dependent Variables

During the round 3 interview, respondents were asked several questions about the amounts and types of preventive health care exams household members may have received. For each adult household member, respondents were asked, "About how long has it been since [person] had [specific preventive health exam] by a doctor or other health professional?" Respondents were asked when the most recent blood cholesterol test, blood pressure (BP) check, and routine checkup occurred for all adults and if adults ≥50 years had ever had a FOBT. The time period for the most recent Pap smear, clinical breast exam, and mammogram was also obtained for all adult women. Response categories included within the past year, within the past 2 years, within the past 3 years, within the past 5 years, >5 years, or never. The focus in this analysis is the proportion of individuals who had these exams during the past year and during the past 2 years in contrast to those who never had the exam or for whom the most recent exam was >1 or 2 years ago. These 2 time periods represent the best practice for many of the exams (exam during the past year) and a maximum time that should elapse between most of these preventive exams (exam during the past 2 years). Indicator variables for each preventive test were constructed to reflect these 2 times. A final dependent variable relates to dental care, in which the respondent was asked, "How often does [person] receive a dental checkup?" Response categories included ≥2 times each year, ≥1 time a year, <1 time a year, and never goes to a dentist. Two indicator variables were created from this item, the first reflecting dental care during the past year and the second indicating dental care during the past 2 years. These were contrasted with those who had never had a dental exam or who had not had dental care during the past 1 or 2 years.

Geographic County Measures

Using county of residence, the MEPS file was merged with data from the Area Resource File (ARF), including Urban Influence Codes (UIC), number of physicians (MDs and DOs) in the county involved in patient care, and the population of the county from the 2000 US Census. The UIC is a 9-category typology that distinguishes counties by population size and geographical relationship to metropolitan areas. County categories included in this coding schema include:

- Large metro areas (population ≥1 million)
- Small metro areas (population <1 million)
- Adjacent to large metro area with a large community (population ≥10,000)
- Adjacent to large metro area without a large community
- Adjacent to a small metro area with a large community
- Adjacent to a small metro area without a large community
- Not adjacent to a metro area with a large community
- Not adjacent to a metro area with a population of 2,500–9,999
- Not adjacent, with no community of ≥2,500.

For more complete descriptions of these see Ghelfi & Parker (1997).

Because of sample size limitations, these categories were collapsed to create a 4-category coding schema intended to reflect steps rather than a smooth continuum of metropolitan to rural counties. These 4 county types are:

- Large metropolitan areas (UIC 1)
- Small metropolitan areas (UIC 2)
- Adjacent to metropolitan areas (UIC 4–6)
- Not adjacent to metropolitan areas (UIC 7–9)

The terms *rural* and *rural nonadjacent* are used interchangeably to refer to this last category.

In addition to these county measures, a variable using data from the ARF to represent the number of physicians involved in patient care per 1,000 population was constructed. In the logistic regression analysis there are also controls for region (Northeast, Midwest, South, and West) and whether a county has been designated either wholly or partially as a health professional shortage area by the Health Resources and Services Administration.

Social, Demographic, and Health Characteristics

Data on social and demographic characteristics, as well as health status, were obtained in the MEPS interview. Characteristics previously identified as dissimilar in examinations of rural–urban comparisons are included. This study is limited to all female household members ≥18 years. Mammography data include only women age ≥40 years. Colon cancer screening exam analyses were limited to those age ≥50 years. Age in years at the end of the year is used in this analysis. Education is incorporated using 3 indicator variables reflecting <12 years of education, 12 years of education or high school graduation, and >12 years of education. Race/ethnicity is coded into 3 categorical variables representing Hispanic, non-Hispanic black, and non-Hispanic white /other. A dichotomous indicator variable is included to represent no health insurance for the full year. Household income status is a categorical variable representing family income as a percent of the poverty line. Four indicator variables represent poor or near poor (≤125% of poverty line), low income (125–200% of poverty line), middle income (200–400% of poverty line), and high income (>400% of poverty line). Dichotomous indicator variables reflect marital status: married, divorced or separated, widowed, and never married. A self-report or proxy report of fair or poor health (versus good, very good, or excellent health), self-/proxy report of a hysterectomy (Pap smear only), and having a usual source of care are included in this multivariate analysis.

Analytic Strategy

A bivariate descriptive analysis of women in large and small MSAs, urban, and rural counties by demographic characteristics was conducted, as well as a between-county descriptive analysis comparing rural women and women from other county types in their reports of preventive health exams during the past year and during the past 2 years. The multivariate analysis was conducted using logistic regression to examine the odds of having the exams during the past 1 year and during the past 2 years for women in small metro, adjacent, and nonadjacent counties in comparison to the reference group (residents of large MSA). The focus of this paper remains primarily on the rural group. Age, education, race/ethnicity, health status, household income status, insurance status, history of hysterectomy, usual source of care, number of patient care physicians per 1,000 population, and region of the country were controlled for in this logistic regression analysis.

Data from the descriptive comparison of characteristics across community type are not presented in table form. This analysis was conducted to clarify differences that exist along the rural–urban continuum. Table 1 is a descriptive comparison of women's use of preventive health services by place of residence. Table 2 details the logistic regression analyses for each of the dependent variables with the basic model (models 1 and 3) and the expanded model (models 2 and 4)

Table 1. Timeline of preventive health exams: United States, 2000, men and women

Exam	Large MSA[a] % (SE)	Small MSA[b] % (SE)	Adjacent[c] (urban) % (SE)	Nonadjacent[d] (rural) % (SE)	Significant pairwise comparisons[b]
	(1)	(2)	(3)	(4)	
Blood pressure					
Past 1 year	85.5 (.54)	87.2 (.75)	88.5 (1.17)	88.2 (1.41)	(1,2)*** (1,3)*** (1,4)**
Past 2 years	91.9 (.46)	93.8 (.69)	94.2 (.85)	93.4 (.91)	(1,2)* (1,3)*
Cholesterol					
Past 1 year	53.4 (1.07)	52.0 (1.86)	54.7 (2.25)	46.7 (3.06)	(1,4)*
Past 2 years	67.6 (1.06)	64.2 (1.70)	67.6 (1.55)	57.7 (2.95)	(1,4)**
Physical exam					
Past 1 year	65.3 (1.05)	69.5 (1.31)	67.8 (1.81)	68.7 (1.89)	(1,2)**
Past 2 years	79.4 (.83)	82.2 (1.20)	79.6 (1.66)	79.4 (2.19)	
FOBT (Age ≥50 y)					
Past 2 years	32.7 (1.93)	34.1 (2.59)	27.9 (2.48)	21.4 (2.81)	(1,4)*** (2,4)***
Dental					
Past 1 year	69.1 (.98)	68.1 (1.77)	63.0 (2.78)	60.0 (2.90)	(1,3)* (1,4)**
Past 2 years	89.2 (.58)	87.2 (1.45)	79.9 (2.54)	80.9 (2.51)	(1,3)*** (1,4)**
Breast exam					
Past 1 year	63.9 (.98)	68.7 (1.46)	65.5 (2.10)	56.7 (2.35)	(1,2)** (1,4)** (2,4)*** (3,4)**
Past 2 years	78.8 (.77)	81.6 (1.17)	79.5 (1.40)	73.5 (2.06)	(1,4)* (2,4)*** (3,4)**
Mammogram (women ≥40)					
Past 1 year	55.7 (1.11)	56.2 (1.73)	50.4 (2.85)	46.0 (3.09)	(1,4)*** (2,4)**
Past 2 years	72.8 (1.06)	71.7 (1.52)	68.0 (2.48)	61.7 (2.94)	(1,4)*** (2,4)**
Pap smear					
Past 1 year	59.3 (.82)	62.8 (1.67)	60.8 (2.04)	51.3 (3.07)	(1,4)* (2,4)*** (3,4)**
Past 2 years	75.6 (.65)	77.6 (1.12)	74.0 (1.90)	69.4 (2.42)	(1,4)* (2,4)***

Note. Standard Errors (SE) noted in parentheses
*p ≤ .05; **p ≤ .01; ***p ≤ .001.
[a]Large metropolitan areas with population ≥1 million persons.
[b]Small metropolitan areas with population <1 million persons.
[c]Counties adjacent to metropolitan areas.
[d]Counties not adjacent to metropolitan areas.
Source. Medical Expenditure Panel Survey 2000

controlling for potential explanatory or mediating characteristics. Table 3 is a graphic organizer of models 2 and 4 from the logistic regression analyses.

All analyses incorporated sample weights, which take disproportionate sampling and nonresponse into account. Standard errors and statistical tests were adjusted using STATA software to account for the complex survey design.

Results

Descriptive Analysis

In comparison to women from large metropolitan places, rural women are generally older, more likely to be married, more likely to be non-Hispanic white, more likely to be poor, and less likely to report family income in the middle to high income categories and they reported less education (data not presented).

Women from the rural counties (nonadjacent rural) were more likely to report BP checks during the past year in comparison to women from all other counties. In all other preventive exams analyzed except physical exams, a smaller percentage of rural women reported exams during the past year. Moreover, proportionately fewer rural women reported FOBT, breast exams, mammograms, and Pap smears, as well as dental exams, during the past 2 years in comparison to women from MSA counties (see Table 1).

This descriptive analysis reveals that rural women generally receive fewer preventive health services when compared to women from metropolitan areas, with the exception of BP checks and physical exams, and the differences often persist across both 1 and 2 years. There are also significant differences in the demographic makeup of these county types. Thus, the remainder of this analysis focuses on multivariate logistic regression designed to determine whether some of the differences in the makeup of communities might account for these differentials.

Multivariate Analysis

Logistic regression models including the county type only are presented in model 1 for service in the past year and model 3 for service in the past 2 years. Full models that adjust for covariates previously discussed are shown in models 2 and 4. In model 1 (see Table 2), rural women (odds ratio [OR]: 1.48, $p \leq .01$) were

Table 2. Odds of obtaining preventive health services by county types, women only: United States

	Model 1 Blood Pressure Past Year	**Model 2** Adjusted	**Model 3** Blood Pressure Past 2 Years	**Model 4** Adjusted
Small metro[a]	1.34 (.11)***	1.22 (.10)	1.18 (.17)	1.10 (.16)
Adjacent[b]	1.51 (.18)***	1.38 (.18)*	1.24 (.24)	1.26 (.26)
Nonadjacent/rural[c]	1.48 (.21)**	1.44 (.22)*	1.06 (.17)	1.15 (.22)
	Blood cholesterol Past year		Blood cholesterol Past 2 years	
Small metro	.94 (.09)	.88 (.08)	.86 (.08)	.81 (.07)
Adjacent	1.05 (.11)	.95 (.10)	1.00 (.08)	.95 (.10)
Nonadjacent/rural	.77 (.10)*	.71 (.11)*	.65 (.08)***	.64 (.09)**
	Physical exam Past year		Physical exam Past 2 years	
Small metro	1.21 (.09)**	1.17 (.08)	1.20 (.12)	1.18 (.11)
Adjacent	1.12 (.11)	1.02 (.12)	1.01 (.12)	1.03 (.13)
Nonadjacent/rural	1.16 (.12)	1.16 (.13)	1.00 (.14)	1.12 (.18)
			FOBT Past 2 years	
Small metro			1.08 (.13)	1.04 (.13)
Adjacent			.65 (.10)**	.70 (.12)*
Nonadjacent/rural			.62 (.15)*	.64 (.16)
	Dental Exam Past Year		Dental Exam Past 2 Years	
Small metro	.95 (.09)	1.01 (.09)	.82 (.08)*	.82 (.11)
Adjacent	.76 (.10)*	.91 (.10)	.94 (.08)	.94 (.09)
Nonadjacent/rural	.67 (.09)**	.83 (.13)	.56 (.09)***	.51 (.09)***
	Breast Exam Past Year		Breast Exam Past 2 Years	
Small metro	1.24 (.10)**	1.29 (.11)**	1.19 (.11)	1.23 (.13)
Adjacent	1.07 (.11)	1.20 (.12)	1.04 (.10)	1.20 (.14)
Nonadjacent/rural	.74 (.08)**	.81 (.08)*	.75 (.09)*	.83 (.10)
	Mammogram (women ≥40) past year		Mammogram (women ≥40) past 2 years	
Small metro	1.02 (.08)	1.03 (.10)	.94 (.08)	.94 (.09)
Adjacent	.81 (.10)	.93 (.12)	.79 (.10)	.90 (.11)
Nonadjacent/rural	.68 (.09)**	.74 (.10)*	.60 (.08)***	.65 (.10)**
	Pap smear past year		Pap smear past 2 years	
Small metro	1.16 (.09)	1.23 (.12)	1.12 (.09)	1.20 (.12)
Adjacent	1.06 (.10)	1.27 (.13)*	.92 (.10)	1.13 (.14)
Nonadjacent/rural	.72 (.09)	.83 (.10)	.73 (.09)	.87 (.10)

Note. Standard Errors presented in parentheses Models 2 and 4 adjusted for age, marital status, race/ethnicity, household income status, health status, hysterectomy (Pap smear only), usual source of care, physicians per capita, education, insurance status (uninsured), and region. Reference cohort is large MSA.

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.

[a]Small metropolitan areas with population <1 million persons.

[b]Counties adjacent to metropolitan areas.

[c]Counties not adjacent to metropolitan areas.

Source. Medical Expenditure Panel Survey, 2000.

more likely than women from large metropolitan counties to report a BP exam during the past year. This difference remained after controlling for differences in demographic characteristics, health characteristics, and access to health care (OR 1.44, $p \leq .05$). Women from large metropolitan areas appeared to be at a disadvantage in obtaining BP checks during the past year in contrast to both non-MSA county types in this analysis (model 2). This was the only preventive health service examined in these analyses in which rural women appeared to have a significant advantage.

Rural women were less likely to report blood cholesterol tests during the past year (adjusted OR .71, $p \leq .05$) and during the past 2 years (adjusted OR .64, $p \leq .01$) in comparison to the reference group (women from large metropolitan counties). There were no statistically significant differences in the likelihood of rural women having a physical exam during the past 1 or 2 years when compared to women from large

Table 3. Summary of multivariate adjusted logistic regression findings

	Blood pressure check 1 year	Blood pressure check 2 years	Cholesterol check 1 year	Cholesterol check 2 years	Physical exam 1 year	Physical exam 2 years	Fecal occult blood 2 year	Dental exam 1 year	Dental exam 2 year	Breast exam 1 year	Breast exam 2 year	Mammogram 1 year	Mammogram 2 year	Pap smear 1 Year	Pap smear 2 Year
Small MSA										+	+			+	
Adjacent	+								−					+	
Not adjacent/rural	+		−	−			%	%	−	−	%	−	−	%	%

Note. Reference group is large MSA.
+ Significantly more likely to report exam during this period, $p \leq .05$.
− Significantly less likely to report exam during this period, $p \leq .05$.
% Significantly less likely to report exam in models that omit income variable, $p \leq .05$.
[a]Small metropolitan areas with population <1 million persons.
[b]Counties adjacent to metropolitan areas.
[c]Counties not adjacent to metropolitan areas.

metropolitan counties. Rural women were less likely than the reference group to report a FOBT during the past 2 years (OR .62, $p \leq .05$), but after controlling for social and demographic characteristics, the differences were no longer statistically significant. Rural women were considerably less likely to report dental care during the past 2 years (adjusted OR .51, $p \leq .001$) when contrasted with women from large metropolitan areas. However, rural women were not significantly less likely to report a dental exam during the past year (adjusted OR .83, $p \leq .05$) when compared to the reference group.

Rural women were less likely than the reference group to have a clinical breast exam during the past year (adjusted OR .81, $p \leq .05$); however, differences were not statistically significant for breast exams during the past 2 years. Rural women were less likely than metropolitan women to report a mammogram over the past year (adjusted OR .74, $p \leq .05$) and, likewise, were less likely to have a mammogram during the past 2 years (adjusted OR .65, $p \leq .01$). Finally, whereas rural women appear to be significantly less likely to have a Pap smear than metropolitan women, after adjusting for sociodemographic characteristics, these differences no longer met our criteria for statistically significant differences (OR .87, $p = .33$) for the past 2 years model.

An additional analytic strategy was employed to clarify the impact of household income status. Models 2 and 4 were analyzed without the contribution made by household income and interacting household income with rural–urban status. In general, the ORs for the county-type categories in the additional models did not move from nonsignificant to significant or vice versa, nor did ORs change demonstrably. Four notable exceptions did emerge in the significance level of ORs (although there was not a large change in the ORs): Rural residents were significantly less likely to report FOBT in the past 2 years, dental exams in the past year, Pap smear in the past 1 and 2 years, and breast exams during the past 2 years in comparison to women from large metropolitan counties (data not presented). Interactions between county type and household income status were not statistically significant.

It must be noted that a few other significant differences exist in these analyses between women from large metropolitan counties and other places of residence (see Table 2). Table 3 provides a graphic organizer reflecting the significant findings.

Discussion

According to the USPSTF, preventive health examinations, including BP checks, physical exams, dental

exams, Pap smears, breast exams, and mammograms should be obtained by women of specific ages every one to two years, with the exception of Pap smears which should be obtained at least every 3 years. Cholesterol checks and colon cancer screening should also occur at regular intervals; usually, no more than 5 years should elapse between exams. In this study, we found that rural women were less likely than their counterparts from large metropolitan counties to obtain many of the recommended examinations during the past year. Moreover, rural women had a lower probability of receiving these exams during the past 2 years when compared to women from large MSAs. Differences in reported use of preventive health services persisted after adjustments for demographic variations between rural and metropolitan places. Access indicators, including having a usual source of care or being uninsured all year, did not appear to explain away many of the differences. Rural women appear to be less likely to report cholesterol checks and mammograms during the previous 1 and 2 years, breast exams during the past 1 year but not 2 years, and dental exams during the past 2 years when compared to women from large MSAs . It did appear to be important to use a more fine-tuned definition of county types; differences emerged in the rural counties that were not present in other non-MSA counties (urban).

Proportionately more rural women had household income in the poor/near-poor or low-income category compared to women in MSA counties; conversely, proportionately fewer rural women had household income in the high-income category. In this paper income emerges as an important mediator for *rurality*. In particular, in models that did not adjust for household income rural women appeared to be less likely to obtain Pap smears (1 or 2 year), breast exams (2 year), FOBTs (2 year), and dental exams (1 year). Once household income was included in the models, however, rural residence was no longer significantly associated with a reduced probability of reporting the exams in the specified time period. Interactions between county type and household income were not significantly associated with the probability of having these exams. This suggests that income rather than rurality explains differences in the probability of having these exams. Nonetheless, given that rural women are more likely to be in poor or low-income households, this is a rural problem. On average, rural women reported lower educational attainment and more uninsurance than their nonrural counterparts. These are characteristics correlated with income and, although not found to be significantly associated with preventive exams, have been identified as associated with having a usual source of care as well as utilization (Larson & Fleishman, 2003).

Because having a health care provider and seeing the health care provider are associated with increased use of preventive health screening (Mayne & Earp 2003), there may be some indirect effects that require further examination. The pathway between rural residence, income and poverty, and use of preventive health care may require more complex modeling strategies to understand which characteristics associated with rural residence will require attention to reduce differentials in the use of preventive health care.

In this analysis there was no adjustment for multiple comparisons of differences between groups. Most of the examinations, with the exception of BP exams, may occur as stand-alone exams. In fact, many of the exams may occur in different settings. For example, women may have their Pap smear with an obstetrician-gynecologist, whereas their mammogram occurs in a diagnostic radiology center. Blood pressure exams and cholesterol blood tests may occur in a primary care setting or potentially at a health fair or work setting. Thus, we believe that distributing the significance testing across all exams would not adequately reflect the multiple settings in which these exams occur. An analysis using Bonferroni adjustment for multiple comparisons of the same exams within 2 time periods was nevertheless conducted and we found that all significant findings remained with the exception of FOBTs.

Heart disease and stroke are the first and third leading causes of death, respectively, in the United States (Minino & Smith, 2001; Sundquist, Winkleby, & Pudaric, 2001). Cancer, including breast and uterine cancer, ranks second as a leading cause of death in women in the United States (National Center for Health Statistics, 2003). Screening exams, such as those mentioned, help to reduce both morbidity and mortality associated with these conditions (USPSTF 2001, 2002a, 2002b, 2003a, 2003b). Differential access to preventive services by a particular group, such as rural women, may disparately increase the risk for mortality or the disabling effects of these conditions.

Two time periods were included for consideration in this analysis—1 and 2 years. One might hypothesize that if distance or, alternatively, local availability of services were the issue, rural women would simply have extended the time period between scheduling and receiving these exams. Thus, one might have expected that rural women would be less likely to obtain the exams at 1 year, but equally likely to have obtained the exams at 2 years when compared to women from large MSAs. However, this was not confirmed in this analysis. Rather, we generally find that disparities in obtaining exams persist across both time periods.

There is clear evidence that compliance with recommendations for preventive health services occurs when individuals have a usual source of care and when the health care provider makes recommenda-

tion and referral for these exams (Mayne & Earp, 2003). Because rural residents are generally more likely to report having a usual source of care, other explanations should be explored (Larson & Fleishman, 2003). There are many potential barriers to utilization of preventive screening (Amery, Miller, & Albrecht, 1997; Higginbotham, Moulder, & Currier, 2001; Lantz, Weigers, & House, 1997; Monroe, Ricketts, & Savitz, 1992).These barriers may fall in several general categories, including time and scheduling, education about which exams are necessary, when the exams are necessary and where to obtain the exams, belief in the value of the exams, provider recommendations and cultural competency to communicate these recommendations, transportation, local availability of services, and financial resources or perceptions about the resources required to obtain the exams. It is difficult to discern which care-seeking issue may be most prevalent in rural places or whether there are other issues for rural women.

It is not clear why rural women were less likely to report the exams investigated here during the recommended time period. Studies directed at these issues often obtain information from individuals already using health services and thereby having a greater probability of using preventive services. The MEPS data do not suffer from this weakness because MEPS is a nationally representative sample of the US population and does not depend on sampling at a point of service. Thus, the survey captures both users and nonusers of health care.

A 2-pronged attack may increase understanding about why these services are underutilized to a greater degree by rural women. First, health literacy and clarification about what women (and men) know about necessary exams will enhance researchers' ability to ask the right questions. Additional data collection efforts that identify nonusers and address issues such as failure to obtain recommended exams, reasons for not obtaining these exams, beliefs about the need or lack of need for these services, and whether providers are providing clear direction about the need for these exams would enhance researchers' and clinicians' understanding of preventive health service utilization. Once the reasons for rural women's lower utilization of preventive health services within recommended time frames are clarified, policymakers and health care providers can start to design programs to increase utilization.

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Author Descriptions

Dr. Larson is a Researcher at the Substance Abuse and Mental Health Services Administration (SAMHSA) and was formerly with the Agency Healthcare Research and Quality (AHRQ) with research interests in rural health care, mental health, women's health, and access/utilization of health services.

Dr. Correa-de-Araujo is the Director of Women's Health and Gender-Based Research at the Agency for Healthcare Research and Quality.