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## Preventive Health Service Use among Rural Women

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### BACKGROUND

Preventive health services are defined as immunizations and screenings for disease that are known to reduce an individual's risk of illness, disability, and death and contribute to national health goals.<sup>1</sup> Preventive health services are an important component in the continuum of care for individuals across all ages. In both the public and private sector, the U.S. has invested substantially in preventive health over the last decade. The federal government has numerous action plans, programs, initiatives, and agencies related to preventive health as well as task forces that draw from national experts to develop evidence-based recommendations on clinical preventive health services. Private foundations and research institutions also contribute prevention priorities and objectives, activities, and recommendations regarding preventive health. Healthy People 2020 calls for increasing and monitoring access to clinical preventive services over the next decade.<sup>2</sup>

Receipt of evidence-based preventive screenings and services can be cost-effective<sup>3-5</sup> and may result in net savings,<sup>6,7</sup> while investment in public health can decrease community-level mortality.<sup>8</sup> Though receipt of adult immunizations and screenings increased between 1987 through 2013,<sup>9</sup> use rates for recommended clinical preventive services remain low overall.<sup>6</sup> Estimates suggest that an increase in the use of daily aspirin, smoking cessation, screening for colorectal and breast cancer, screening for chlamydial infection, and influenza immunization could save more than 100,000 lives annually.<sup>10</sup> Additionally, prevention has the immeasurable impact of avoiding illness, benefitting households and communities, and boosting workplace productivity.<sup>11</sup>

Though dated, analyses from 2002-2008 and 2010 suggest that rural women receive screenings for breast and cervical cancer at lower rates than their urban counterparts.<sup>12,13</sup> In a five state study (Connecticut, Massachusetts, Rhode Island, West Virginia, and Wyoming), rural women were less likely to have had human papillomavirus (HPV) vaccinations,<sup>14</sup> while another study found rural adolescent girls were less likely to receive HPV vaccinations compared to urban adolescent girls.<sup>15</sup>

Rural women may derive benefits from health promotion activities given their health status and risk factors. Compared to urban, rural women are more likely to report fair or poor health status<sup>16</sup> and risk factors that are amenable to public health interventions,

### Key Findings

Despite poorer health status and health behaviors that place them at risk for chronic illness, rural women are less likely to receive preventive health services than urban women.

Rural women report lower use of mammogram or HPV vaccine, even after controlling for rural-urban differences in factors associated with use such as educational attainment, income, and insurance status.

Factors specific to rural communities may influence rural women's use of preventive services, such as provider practice patterns and supply, rural culture, and patient knowledge and perceived value of preventive care.

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such as cigarette smoking,<sup>16,17</sup> inadequate or no physical activity,<sup>18</sup> and obesity.<sup>18,19</sup> Elevated smoking and obesity rates in rural populations have been attributed in part to poorer access to preventive medical care and evidence-based prevention programs in rural areas.<sup>20</sup> Research suggests that rural women have higher cervical cancer incidence and mortality rates than urban women, and this could be related to more limited access to preventive services.<sup>21</sup>

Socioeconomic factors may impact access to preventive services for rural residents. Previous studies have found that lack of insurance is significantly associated with decreased use of preventive services,<sup>12,22-24</sup> and rural women have historically been more likely to be uninsured than their urban peers.<sup>25</sup> Given that rural women have also been more likely than urban women to experience problems paying medical bills and to delay or forgo needed care because of cost,<sup>16</sup> out-of-pocket spending may limit their use of preventive services, and high uninsured rates may exacerbate this problem. Cost is a barrier to receipt of vaccinations<sup>26</sup> and mammograms,<sup>27</sup> while having private health insurance promoted receipt of breast cancer screening among rural women.<sup>28</sup> However, among the total U.S. population, eliminating cost-sharing has resulted in only select improvements in receipt of recommended preventive services.<sup>29,30</sup>

While multiple studies suggest that rural women may use preventive services at lower rates than urban women, this research has limitations. For example, some previous research examining rural women's use of preventive health services is dated, while other studies examined narrow populations (e.g., women with disabilities,<sup>12</sup> specific ages<sup>26</sup> or states<sup>27</sup> or did not include an urban comparison<sup>28</sup>). Additionally, it appears that sociodemographic factors could influence rural women's access to preventive services. This study provides a more current examination of national data to understand whether preventive health services differences among rural and urban women can be explained by health status and sociodemographic characteristics.

## METHODS

This study aims to understand the preventive health service use of rural women over age 18 by addressing the following research questions:

- How do rural and urban women vary on receipt of preventive health services?

- What health status and sociodemographic factors are associated with receipt of preventive health services? Do these factors explain any observed differences between rural and urban women?

**Data.** This study used the National Health Interview Survey (NHIS), a nationally representative survey conducted by the National Center for Health Statistics (NCHS). The NHIS is designed to monitor the health of the U.S. population on a broad range of topics including health status, access barriers, health related behaviors, risk factors, and demographic and socioeconomic information.<sup>31</sup> The study population includes community-dwelling U.S. women for the years 2014 to 2016. For each year of the survey, about 19,000 women participated in the Sample Adult portion of the NHIS. Using three years of data provided a pooled sample of approximately 57,000 respondents. Because the NHIS does not contain a rural-urban indicator, we followed the process of the NCHS Research Data Center to link the Rural-Urban Continuum Codes (RUCC) to these data.<sup>32</sup>

**Variables.** The dependent variables in our analyses were preventive health services used by women, including receipt of cholesterol check, fasting blood sugar test, mammogram, and pap smear in the past year, and ever having received at least one dose of the HPV vaccine. Our primary independent variable was rural or urban residence based on county level designation of metropolitan statistical area (MSA) or non-MSA. Covariates in our multivariable analysis included factors previously associated with preventive service use, including age, race/ethnicity, marital status, educational attainment, reported health status, income as a percent of the federal poverty level (FPL), and health insurance source.

**Analysis.** We used bivariate and multivariable techniques to compare receipt of preventive health services among rural and urban women. At the bivariate level, we compared rural and urban women in 2014-2016 by sociodemographic characteristics and receipt of preventive health services. We used multivariable logistic regression models to estimate the odds of receiving a mammogram in the past year and the odds of ever receiving an HPV vaccine. We selected these measures for further analysis because they were less likely to be affected by differences between the recommended periodicity of the service and the single-year look back period available in the NHIS (see Table 1). Results are presented as odds ratios with 95 percent confidence intervals. We weighted our analyses to adjust for the sampling design of the NHIS. All statistical tests were completed in SUDAAN version 11 (Research Triangle Institute,

Research Triangle Park, NC) to adjust for clustering and to yield valid standard errors for weighted data. All reported differences are statistically significant at the  $p < .05$  level.

To the extent possible with the NHIS data, we limited analysis for each preventive health service type to fit national standards and age range recommendations. We restricted preventive health services to specific categories of women as shown in Table 1.

## FINDINGS

**Rural-urban differences in receipt of preventive health services.** Across the services examined, rural women were less likely to receive a variety of preventive health than urban women. In the past year, rural women were less likely than urban women to have had their cholesterol checked, to have received a fasting blood sugar test, to have received a mammogram or pap smear, and to have ever received an HPV shot (Figure 1). About two-thirds of all women received a cholesterol check from a health professional in the past year, but rural women were slightly but significantly less likely than urban women to have received a cholesterol check (67.8 percent vs. 71.7 percent). Among women between ages 21 and 65, slightly less than half (48.1 percent) of rural women received a pap smear in the

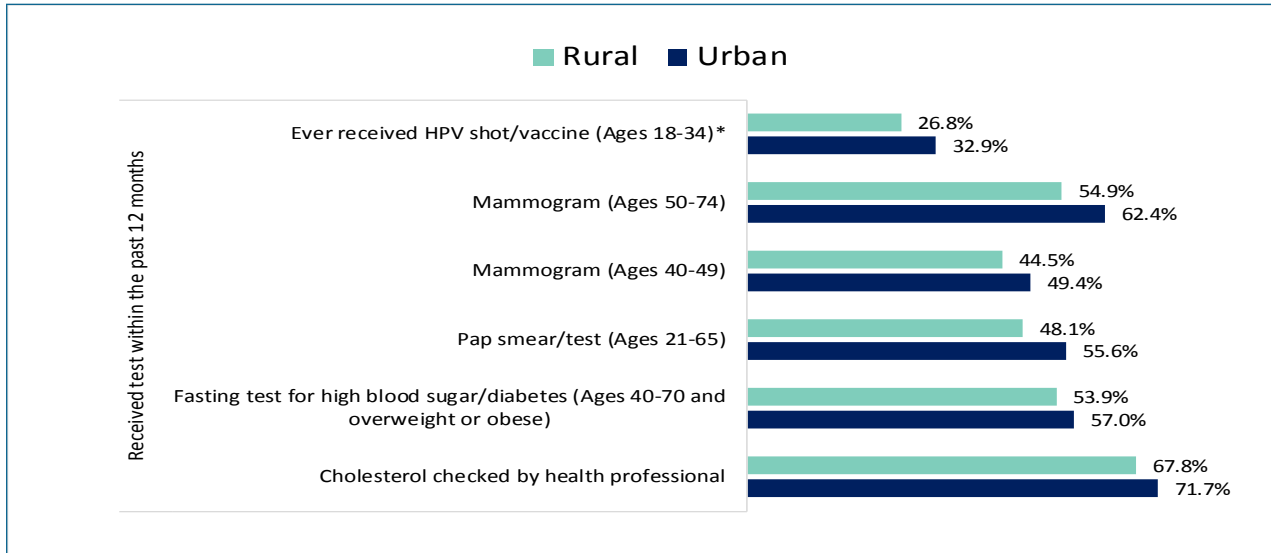
past year compared to 55.6 percent of urban women. Rural women in both age categories (40-49 and 50-74) were less likely to receive a mammogram in the past year than urban women, however, there was a larger difference between older rural and urban women than younger women. Less than one-third of all women ages 18-34 had ever been vaccinated against HPV and only 27 percent of rural women had received this vaccine compared to 33 percent of urban women.

**Health status and sociodemographic characteristics of women aged 18 and older in rural and urban areas.** Compared to urban women, a greater proportion of rural women experienced fair or poor health status overall and other markers that put them at greater risk for chronic illness (Figure 2). Rural women were more likely than urban women to report that they were current cigarette smokers, that their overall health status was fair or poor, or that they were obese. As shown in Figure 2, 21.4 percent of rural women were current smokers compared to 12.8 percent of urban women. Over two-fifths (41.4 percent) of rural women reported a body mass index indicative of obesity compared to nearly one-third (32.1 percent) of urban women. Additionally, rural women were more likely to be unemployed, have income near or below the federal poverty level, and have public insurance

**Table 1: National Standards for Preventive Screening by Service**

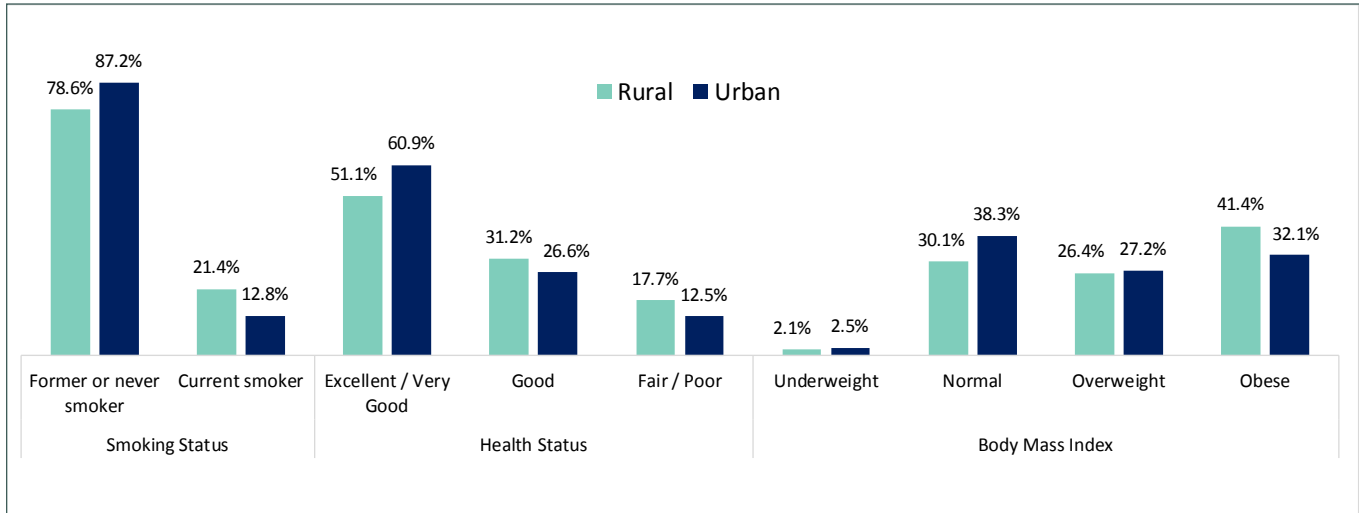
Preventive Service	Standard for Preventive Screen	Analytic Response
Mammogram	The U.S. Preventive Services Task Force (USPSTF) has recommendations for separate age groups; (a) women ages 40-49 choose whether to begin biennial mammography screenings; (b) women ages 50-74 are recommended to have biennial mammography screenings. <sup>33</sup>	We examined the receipt of mammograms in the past year for women ages 40-49 and 50-74 separately, but we were unable to determine whether women ages 40-49 had a mammogram every other year.
Pap Smear	The USPSTF recommends women ages 21-65 have a cervical cancer screening every three years. <sup>33</sup>	We were able to examine whether women ages of 21-65 had received a cervical cancer screening once in the past 12 months only, rather than whether women had received the screening within a three year interval.
HPV Vaccine	The HPV vaccine Gardasil was first approved by the FDA in 2006 and is recommended for females ages 9-26. <sup>34</sup>	Since our data includes individuals ages 18 and older, and the data (2014-16) came eight years after the vaccine was approved, we restricted our analyses to women ages 18-34.
Fasting Blood Sugar Test	The USPSTF recommends that individuals ages 40-70 who are overweight or obese receive this screen for diabetes. <sup>33</sup>	We restricted our analysis to women ages 40-70 who have a body mass index (BMI) of 25 or over indicating overweight or a BMI of 30 or over indicating obesity.

**Figure 1. Receipt of Preventive Health Services Among Rural and Urban Women, 2014-2016**



Data: National Health Interview Survey, 2014-16. Residence differences significant at  $p < .001$

**Figure 2. Health Status Indicators Among Rural and Urban Women Aged 18 and Older, 2014-2016**



Data: National Health Interview Survey, 2014-16. Residence differences significant at  $p < .001$

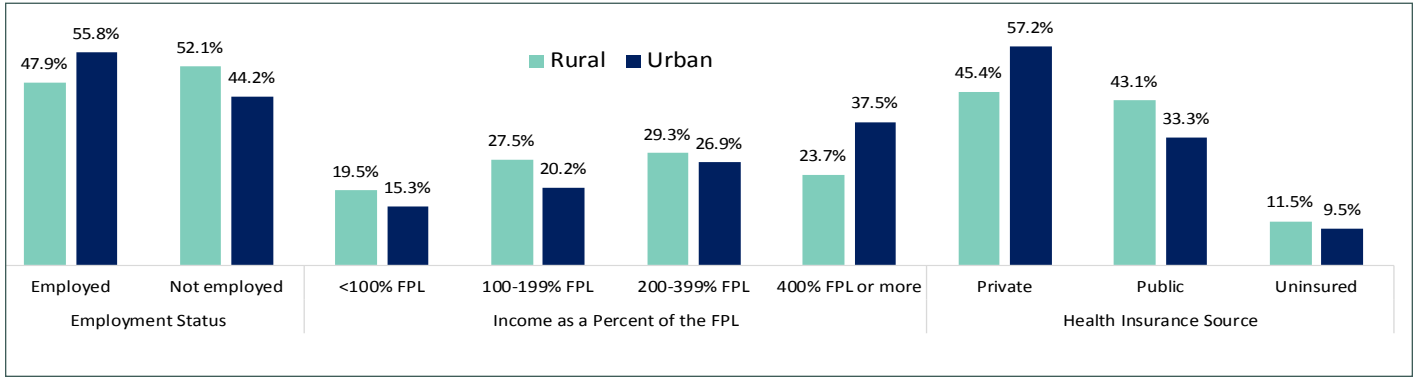
or be uninsured. For example, 43.1 percent of rural women had public sources of health insurance such as Medicaid compared to 33.3 percent of urban women (Figure 3).

**Factors associated with receipt of mammograms and HPV vaccines.** We used logistic regression to compare the odds of receiving a mammogram in the past year and the odds of ever receiving at least one dose of the HPV vaccine for rural versus urban women. When we controlled for age, race/ethnicity, marital status, educational attainment, income, and health insurance status, rural women had significantly reduced odds of receiving a mammogram compared to urban women (Table 2). The odds of mammogram receipt in the past year were 11 percent lower for rural women ages 40-74 than urban (OR: 0.89; CI: 0.81, 0.98). Age 50 and over

and non-white race were associated with greater likelihood of receiving a mammogram in the past year, while being unmarried, having less than a college degree, low to moderate income, and being uninsured was associated with lower likelihood of receiving a mammogram.

Controlling for sociodemographic characteristics, the odds of ever receiving an HPV vaccine were 22 percent lower for rural women ages 18-34 than their urban peers (OR: 0.78; CI: 0.65, 0.93). Women between the ages of 18 and 25 and those who were unmarried had higher odds of ever having received the HPV vaccine, while being non-White, having less than a college degree, low to moderate income, and being uninsured were significantly associated with reduced odds of ever having received the HPV vaccine.

**Figure 3. Sociodemographic Characteristics Among Rural and Urban Women Aged 18 and Older, 2014-2016**



Data: National Health Interview Survey, 2014-16. Residence differences significant at p<.001

**Table 2. Logistic Regression Predicting Preventive Health Service Receipt for Rural and Urban U.S. Women**

Control Variables	Mammogram Received by Women Ages 40-74 in the Past Year O.R. (95% C.I)	HPV Vaccine Ever Received by Women Ages 18-34 O.R. (95% CI)
<b>Residence</b>		
Urban	1.00	1.00
Rural	0.89 <sup>a</sup> (0.81, 0.98)	0.78 <sup>b</sup> (0.65, 0.93)
<b>Age</b>		
18-25	--	3.02 <sup>c</sup> (2.63, 3.46)
26-34	--	1.00
40-49	1.00	--
50-64	1.55 <sup>c</sup> (1.42, 1.69)	--
65-74	1.95 <sup>c</sup> (1.72, 2.21)	--
<b>Race / Ethnicity</b>		
White, not Hispanic	1.00	1.00
Black, not Hispanic	1.58 <sup>c</sup> (1.42, 1.76)	0.82 <sup>a</sup> (0.68, 0.97)
Hispanic	1.29 <sup>c</sup> (1.14, 1.46)	0.76 <sup>b</sup> (0.64, 0.90)
Other	0.99 (0.86, 1.15)	0.59 <sup>c</sup> (0.48, 0.73)
<b>Marital Status</b>		
Married	1.00	1.00
Unmarried	0.88 <sup>c</sup> (0.82, 0.95)	1.71 <sup>b</sup> (1.49, 1.95)
<b>Education</b>		
Less than high school	0.79 <sup>c</sup> (0.69, 0.90)	0.47 <sup>c</sup> (0.36, 0.60)
High school or some college	0.77 <sup>c</sup> (0.71, 0.83)	0.69 <sup>c</sup> (0.60, 0.79)
College degree or higher	1.00	1.00
<b>Income</b>		
<100% FPL	0.56 <sup>c</sup> (0.49, 0.64)	0.87 (0.71, 1.06)
100-199% FPL	0.58 <sup>c</sup> (0.51, 0.64)	0.72 <sup>c</sup> (0.60, 0.87)
200-399% FPL	0.73 <sup>c</sup> (0.66, 0.80)	0.79 <sup>b</sup> (0.68, 0.93)
400% FPL or more	1.00	1.00
<b>Source of Health Insurance</b>		
Private	1.00	1.00
Public	0.93 (0.83, 1.04)	0.88 (0.74, 1.04)
Uninsured	0.31 <sup>c</sup> (0.27, 0.36)	0.49 <sup>c</sup> (0.40, 0.60)

Data: National Health Interview Survey, 2014-16. Residence differences significant at p<.05<sup>a</sup>; p<.01<sup>b</sup>; p<.001<sup>c</sup>. Statistics are weighted to population level using weights provided with the NHIS.

**Limitations.** The NHIS is a cross-sectional survey, which does not allow us to draw conclusions about the timing of events or causal relationships in the data and only reflects circumstances during the time period examined. In addition, preventive health services are self-reported in the NHIS and may be subject to recall error by the respondent. However, there is no reason to suspect that systematic differences exist in recall between rural and urban respondents. The NHIS questions respondents whether they received several preventive health services within the past 12 months, rather than within the USPSTF recommended time frame. As a result, our findings may suggest lower adherence to USPSTF recommendations if the respondent did not receive the preventive health service in the past 12 months, but is still up-to-date based on the national standards. Finally, the NHIS only includes an indicator of ever receiving an HPV vaccine and does not provide information on number of doses, so we are unable to determine if women received the full two or three dose regimen recommended by age for highest efficacy.<sup>34</sup>

## DISCUSSION

Despite intensive efforts in recent years to expand preventive service use, our bivariate findings show that rural women continue to lag behind urban women on receipt of an array of nationally recommended and other preventive services. This is of particular concern given that our findings suggest that rural women are more likely to have risk factors for ill-health (e.g., smoking and obesity) and, as shown by prior research, are at higher risk for cancer, heart disease, and other chronic illnesses compared with urban women.<sup>16-19</sup> Thus, lower receipt of preventive care services among rural women may represent a missed opportunity to prevent and/or identify and manage chronic illness at an earlier stage, and to reduce rural-urban disparities in women's morbidity and mortality.

Some differences in service use may be explained by rural-urban differences in demographic and economic characteristics such as race/ethnicity, marital status, education, poverty, and insurance coverage. However, our multivariable findings reveal that rural women remained at reduced odds of receiving a mammogram or HPV vaccine despite controlling for these characteristics. Other factors specific to rural communities may influence rural women's use of these particular preventive services. Provider supply may impact access and use of preventive services in rural

areas, since rural areas are more likely to have health professional shortages than urban areas, limiting provider and service options for rural residents.<sup>35,36</sup> These provider shortages can lead to lengthy travel distances to access preventive services, which has been identified as a barrier to mammography for rural Missouri women,<sup>37</sup> to adherence to preventive guidelines for rural primary care patients in Missouri,<sup>38</sup> and to colorectal and mammography screening among American Indian and Alaska Native seniors.<sup>39</sup>

Culture in different rural areas may also limit rural women's access to preventive services. While not examined in this study, leaders of social networks in Appalachian Kentucky and Ohio described barriers to colorectal cancer screening as negative perception of the procedure and a lack of familiarity or access to the medical system generally.<sup>40</sup> Rural Wyoming women identified fear of a cancer diagnosis as a barrier to mammography screening.<sup>41</sup> Lastly, knowledge, understanding, or value of preventive services may drive rural women's use of preventive services. Past research has found that rural women have limited knowledge of HPV and future cancer risks stemming from the virus,<sup>42</sup> the need for colorectal cancer screening,<sup>40</sup> and the connection between preventive dental care and reduced pain and disease in the future.<sup>43</sup> In general, rural residence has been associated with lower perceived need for services even after controlling for measures known to be associated with evaluated need.<sup>44</sup> Other factors in rural areas may affect access to care including provider and community bias,<sup>45</sup> previous experiences with providers,<sup>46,47</sup> social norms and awareness,<sup>46,48</sup> and intimate partner relationships.<sup>47,49</sup>

To improve rural women's use of preventive health services, it is important to understand the reasons for their lower participation compared with urban women. For some services, it appears that socioeconomic factors such as education, income, or health insurance coverage may explain rural-urban differences, suggesting that reducing these access barriers may improve rural women's rates of service use. However, our study found that rural-urban differences persist for mammogram and HPV vaccine despite controlling for these factors. Further research is needed to understand what other factors may explain these differences in use of preventive health services and how to effectively provide outreach and education to rural women that will increase their use of mammograms and HPV immunizations. In addition, policies and programs designed to improve access to women's cancer screening and HPV participation, such as the National Breast and Cervical Cancer

Early Detection Program (NBCCEDP),<sup>50</sup> should target and assess rural women's participation. Recognizing this, the U.S. Department of Health and Human Services recently included a focus on rural providers in its four strategies for improving HPV vaccination coverage rates.<sup>51</sup> Some states have also explicitly targeted rural areas in their continued implementation of the NBCCEDP.<sup>52,53</sup> Further monitoring of these efforts and sharing of promising practices may help reduce rural-urban disparities in cervical cancer screening and receipt of HPV vaccinations.

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