Chapter 6

Health and Healthcare for Veterans in VHA in Rural Areas

Ashley Cozad, MPH

Gina Capra, MPA

Nancy Maher, PhD

Section I: Significance & Background

Over one third of the Veterans served by the Veterans Health Administration reside in rural areas; in FY13 this included over 2.1 million Veteran VHA patients, or approximately 37% of the patient population *(Exhibit 6-1)*.[1] These rural Veterans often face issues in accessing high quality health care both within and outside of VA including geographical (e.g., drive time), financial, cultural, temporal, and digital (connectivity) barriers.[2] Even more importantly, these access barriers can lead to disparities in quality of care and health outcomes as well as impacts to perceptions, utilization, and satisfaction with the healthcare system.[2] For example, rural residents have been shown to have consistently lower health-related quality of life scores across a variety of disease categories than their urban counterparts.[3, 4] Additionally, rural residents have been found to be less likely to receive recommended treatment across several illnesses including stroke,[5] myocardial infarction,[6] and breast cancer,[7] to name a few. Further, rural residents often have lower rates of utilization, including preventive health services,[8] and those with the longest travel times are most likely to be lost to attrition.[9]

These examples highlight just a few of the ways in which barriers to health care access in rural areas leads to differential outcomes and it helps exemplify the importance of exploring and addressing these issues. Further, these examples and findings help explain some of the key issues to serving our rural Veterans who face similar issues as the rural population in general. To continue the discussion on this issue, this chapter provides a brief overview of the current state of health among rural Veterans by utilizing data for the entire VHA Veteran population during FY13 and provides overall rates of diagnosed medical conditions by Urban/Rural/Highly Rural (URH) codes.[10] Additionally, this chapter uses literature from rural health research more broadly in an attempt to explain some of the factors and determinants of these issues.

1 These numbers refer to Veterans who used any VHA care in FY2013 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY2013 VHA patients" (Data source: WHEI Master Database).

2 Fortney JC, Burgess JF, Bosworth HB, Booth BM, Kaboli PJ. A re-conceptualization of access in the 21st century healthcare. *J Gen Intern Med.* 2011;26(suppl 2),639-647.

3 Weeks WB, Kazis LE, Shen Y, Cong Z, Ren XS, Miller D, Lee A, Perlin JB. Differences in health-related quality of life in rural and urban Veterans. *Am J Public Health.* 2004;94(10),1762-1767.

4 Weeks WB, Wallace AE, Wang S, Lee A, Kazis LE. Rural-urban disparities in health-related quality of life within disease categories of Veterans. *Journal of Rural Health*. 2006;22(3),204-211.

5 Leira EC, Hess DC, Torner JC, Adams HP. Rural-urban differences in acute stroke management practices: A modifiable disparity. *JAMA, Neurology.* 2008;65(7),887-891.

6 Baldwin LM, Chan L, Andrilla CH, Huff ED, Hart LG. Quality of care for myocardial infarction in rural and urban hospitals. *Journal of Rural Health*. 2010;26(1),51-57.

7 Haggstrom DA, Quale C, Smith-Bindman R. Differences in the quality of breast cancer care among vulnerable populations. *Cancer.* 2005;104(11),2347-2358.

8 Casey MM, Call KT, Klingner JM. Are rural residents less likely to obtain recommended preventive healthcare services? *Am J Prev Med.* 2001;21(3),182-188.

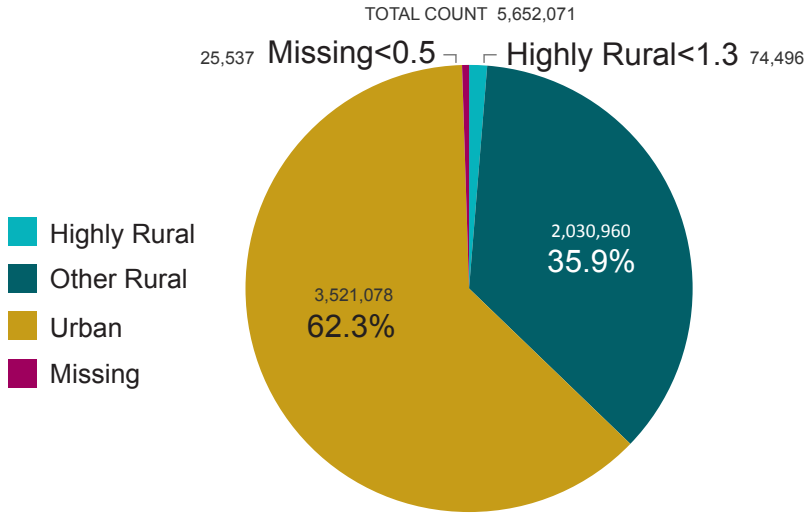
9 Friedman SA, Frayne SM, Berg E, Hamilton AB, Washington DL, Saechao F, Maisel NC, Lin JY, Hoggatt KJ, Phibbs CS. Travel time and attrition from VHA care among women veterans: How far is too far? *Medical Care.* 2015;533(4 Suppl 1),S15-S22.

10 In FY13 (and prior), VA defined rurality by using the three-category URH scheme, which gave each Veteran the designation of urban, rural, or highly rural based on U.S. Census Bureau information and Veteran residence. This classification system was updated in FY15 to the US Department of Agriculture (USDA) and Department of Health and Human Services (HHS) Rural-Urban Commuting Area (RUCA) methodology to allow for increased consistency across federal agencies in the definition of rural designation and to allow for improved accuracy in the planning and deployment of resources by the Veterans Health Administration. (See: West AN, Lee RE, Shambaug-Miller MD, et.al. Defining "rural" for Veterans' health care planning. Journal of Rural Health. 2010;26(4):301-309.)

Distribution of Veteran VHA Patients by Rural/Urban Status

EXHIBIT 6-1

DISTRIBUTION OF RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Note: Categories for the URH codes are as follows: "highly rural" applies to Veterans who have an address in an county with <7 residents per square mile, "rural" applies to Veterans who have an address in any other non-urban location, and "urban" applies to Veterans who have addresses in areas with 50,000 or more people.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

Section II: Sociodemographics

The demographic profile of rural vs urban Veterans can be seen below. In general, rural and highly rural Veterans were predominately male and Caucasian, which is similar to the population distribution more generally in rural areas.[11] However, as the presence of women and minorities in the military continues to grow, the demographic profile of rural Veterans will also reflect these changes.[12]

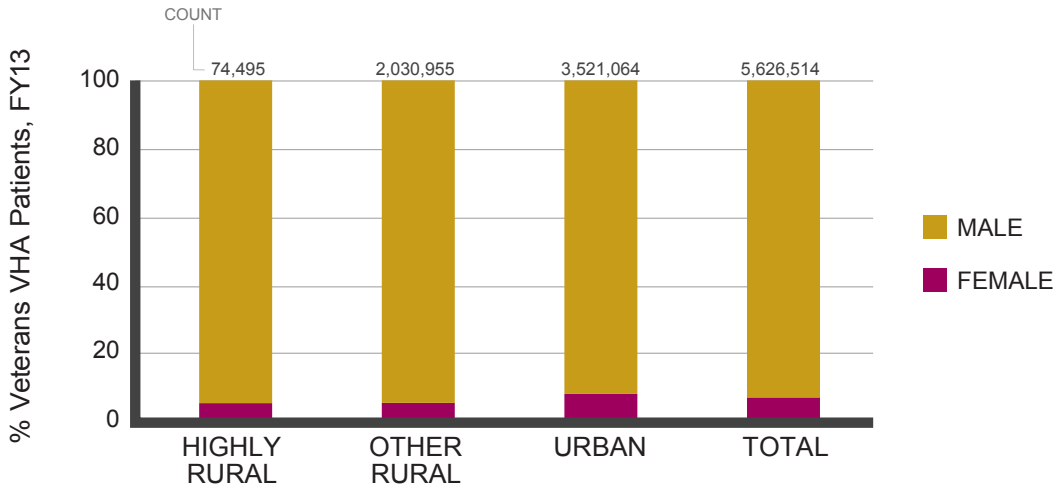
Additionally, rural and highly rural Veterans tended to be older than their urban counterparts, which mirrors larger rural population trends, where younger people tend to leave rural areas as young adults while older adults are more likely to migrate to rural areas.[11] It will be important for rural health care systems, strategic planners, and service providers to prepare for the challenges of this aging demographic.

Gender by Rural/Urban Status

Of the Veterans residing in rural areas, a large majority, 94.9%, were male. This pattern is slightly higher than urban Veterans, where 92.3% were male *(Exhibit 6-2)*.

EXHIBIT 6-2

PERCENT DISTRIBUTION OF GENDER BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,557
Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).
Source: VHA National Health Equity Report 2016

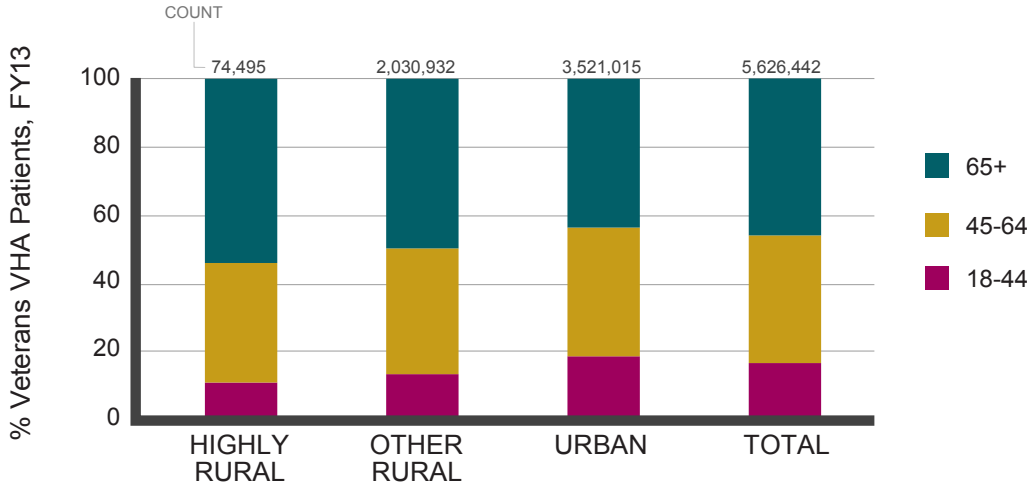
11 Johnson K. (2006). Demographic trends in rural and small town America. Durham, NH: University of New Hampshire, Carsey Institute.
12 United States Department of Agriculture (USDA). (2013). Rural Veterans at a glance. *Economic Brief*, 25, 1-6.

Age by Rural/Urban Status

Rural and highly rural Veterans tended to be older than their urban counterparts. As seen in *Exhibit 6-3*, 50.4% of rural or highly rural Veterans were age 65 or older, while 44.0% of urban Veterans fell into this age category. Additionally, only 12.5% of rural or highly rural Veterans were aged 18-44, while nearly 17.9% of urban Veterans fell into the youngest age category.

EXHIBIT 6-3

PERCENT DISTRIBUTION OF AGE BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,557
Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).
Source: VHA National Health Equity Report 2016

Race/Ethnicity by Rural/Urban Status

Overall, a large majority of enrolled Veterans were White (73.1%), but this majority was even higher in rural and highly rural Veterans where 85.3% of the Veteran population was White versus 65.8% for urban Veterans *(Exhibit 6-4).* This also equates to lower minority numbers in rural areas. For example, 20.3% of the urban Veteran population was Black or African American while only 7.4% of the rural and highly rural Veterans identified as Black or African American.

EXHIBIT 6-4

PERCENT DISTRIBUTION OF RACE/ETHNICITY BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13

Count	Highly Rural 74,496	Other Rural 2,030,960	Urban 3,521,078	TOTAL 5,626,534
Race/Ethnicity	%	%	%	%
American Indian/Alaska Native	2.5	0.7	0.4	0.6
Asian	0.2	0.2	1.1	0.8
Black/African American	0.8	7.7	20.3	15.5
Native Hawaiian/Other Pacific Islander	0.4	0.5	0.7	0.6
Multi-race	0.6	0.5	0.6	0.6
Hispanic	5.1	2.2	7.2	5.4
Unknown	4.0	3.0	3.9	3.6
White	86.4	85.2	65.8	73.1

Missing = 25,537

Note: The FY13 Veteran VHA cohort includes all Veteran patients regardless of where they live. However, in crosstab of rural/urban residence by race/ethnicity, individuals with missing URH values, 0.5% of the FY13 Veteran patients, are not included. Zip codes from American Samoa, Guam, and the Philippines had missing values on the rural/urban variable; therefore they are not included here. Individuals from Puerto Rico and the US Virgin Islands are included.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

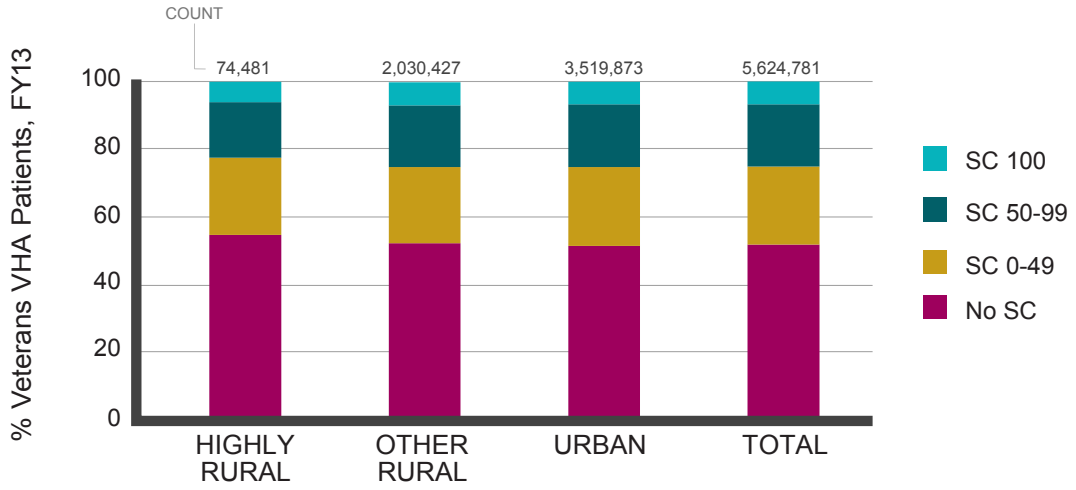
Source: VHA National Health Equity Report 2016

Service-Connected Rating Status by Rural/Urban Status

Rural and urban Veterans were largely similar in their distribution of service-connected status category *(Exhibit 6-5)*. However, there tended to be a higher percentage of highly rural Veterans who had no service connection (54.3% versus 51.0%) and slightly fewer highly rural Veterans with a service connection rating between 50-99 (16.5%) compared with their rural (18.4%) and urban (18.7%) counterparts.

EXHIBIT 6-5

PERCENT DISTRIBUTION OF SERVICE-CONNECTED STATUS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,290
Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).
Source: VHA National Health Equity Report 2016

Section III: Utilization

Past research has suggested that rural populations utilize health services less often than urban populations, for example, lower rates of preventive health services use.[13] Rural location and the associated travel burden can also lead to differences in treatment patterns.[14] However, as a whole, the utilization rates reported here for Veteran VHA patients do not appear to be vastly different between rural and urban Veterans. While this suggests that broadly there are not large differences between these groups in general utilization numbers, it is important to note that these numbers reflect only the number of visits in a few general categories, and do not control for other factors that may influence utilization. It is possible that there are important differences in utilization by specific illness category, by specific services, type of care, or other more specific measures, all of which should be examined in future evaluations.

VHA Outpatient Encounters by Rural/Urban Status

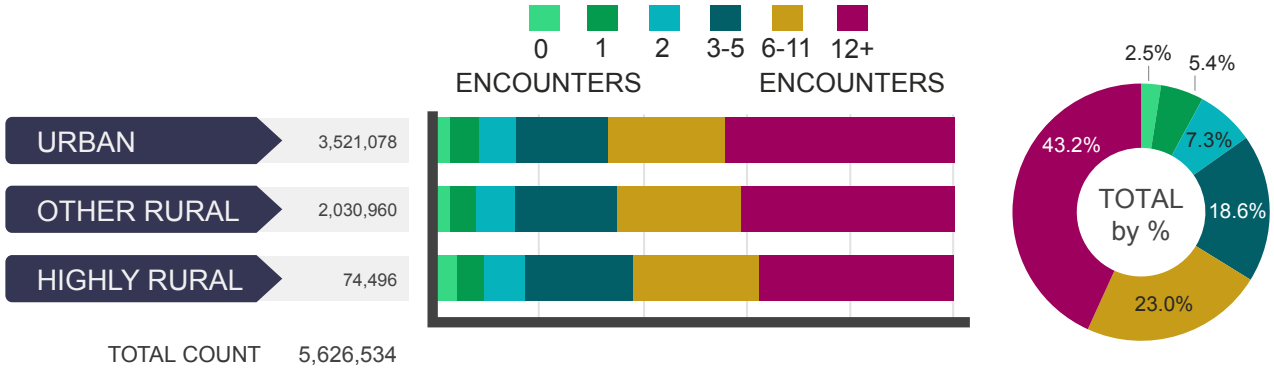
Highly rural Veterans were most likely to have had no outpatient visits during the year (3.8% versus 2.5% in rural and 2.4% in urban Veterans) and they were the least likely to have 12+ encounters in the past year (37.7% versus 41.2% in rural and 44.5% in urban Veterans) *(Exhibit 6-6)*. However, when considering the middle ranges of encounters, in several instances highly rural and rural Veterans were more likely to fall into those categories than their urban counterparts (e.g. 3-5 encounters and 6-11 encounters).

13 Casey, MM, Call KT, Klingner JM. Are rural residents less likely to obtain recommended preventive healthcare services? *Am J Prev Med.* 2001;21(3),182-188.

14 Meden T, Larkin CS, Hermes D, Sommerschield S. Relationship between travel distance and utilization of breast cancer treatment in rural Northern Michigan. *JAMA.* 2002;287(1),111.

EXHIBIT 6-6

PERCENT DISTRIBUTION OF OUTPATIENT ENCOUNTERS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

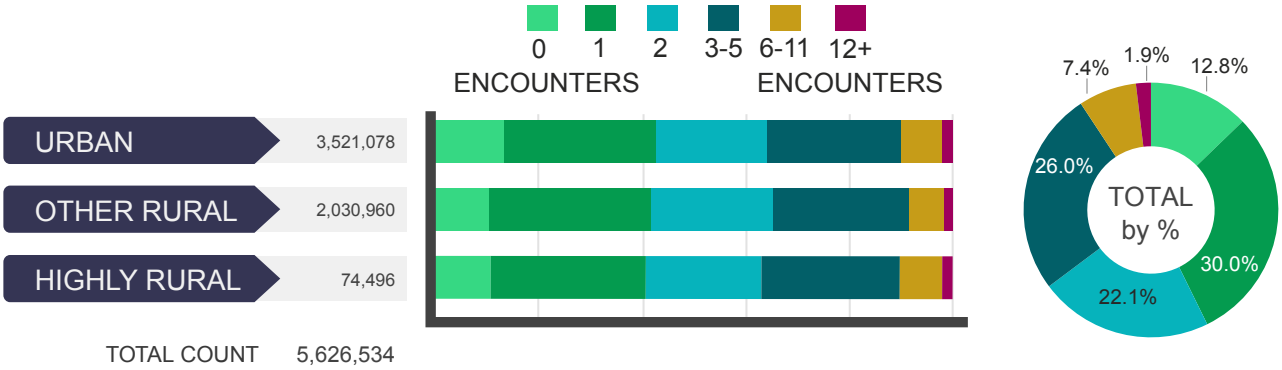
IMPLICATIONS This finding broadly suggests that those living furthest from VA facilities are the most likely to go without an outpatient visit during a given year and the least likely to have 12+ encounters. However, this finding does not reflect variations in illness categories in this encounter data by rural/urban status.

Primary Care Encounters by Rural/Urban Status

There were only small differences in trends among primary care encounters between rural and urban Veterans. An interesting finding is that urban Veterans were most likely to have had no annual follow up (13.9% versus 10.9% rural and 11.3% highly rural) in the past year *(Exhibit 6-7)*.

EXHIBIT 6-7

PERCENT DISTRIBUTION OF PRIMARY CARE ENCOUNTERS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

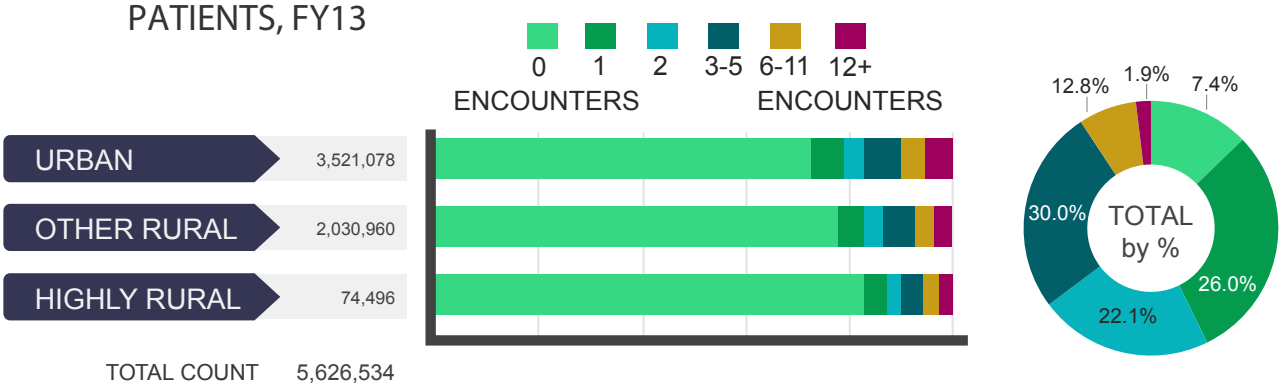
IMPLICATIONS Rates of primary care follow-up are actually quite high in VA compared to national rates outside the VA, which likely reflects the systems VA has put into place to promote retention in VA primary care. However, utilization will be an interesting area to monitor as the Veteran Choice Program increases access to a broader network of community based providers which may result in changes to the rural/urban utilization dynamics.

Mental Health/Substance Use Disorder Encounters by Rural/Urban Status

The large majority of enrolled Veterans did not have any Mental Health or Substance Use Disorder visits during FY13 *(Exhibit 6-8)*. This was especially true for highly rural Veterans of which 83.0% had no encounters, and rural Veterans, of which 77.9% had no encounters (versus 72.8% of urban patients having no encounters).

EXHIBIT 6-8

PERCENT DISTRIBUTION OF MENTAL HEALTH/SUBSTANCE USE DISORDER ENCOUNTERSBY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

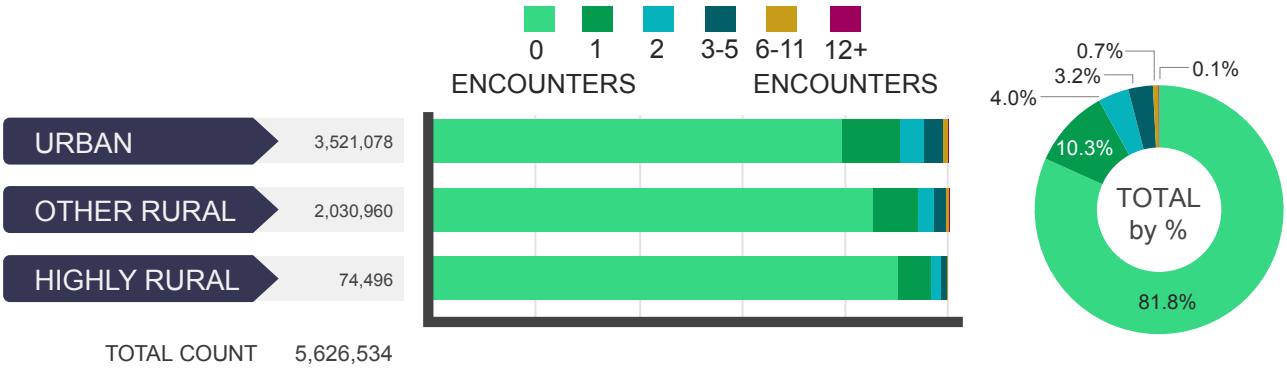
IMPLICATIONS This finding, in combination with the lower rates of diagnosed mental health conditions described in the section below, could suggest that rural Veterans are seeking care and/or being diagnosed less often than their urban counterparts, rather than that rural Veterans have fewer mental health issues.

Emergency Department Encounters by Rural/Urban Status

Rural and highly rural Veterans were less likely to utilize VA emergency department services than urban Veterans *(Exhibit 6-9)*.

EXHIBIT 6-9

PERCENT DISTRIBUTION OF EMERGENCY DEPARTMENT ENCOUNTERS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

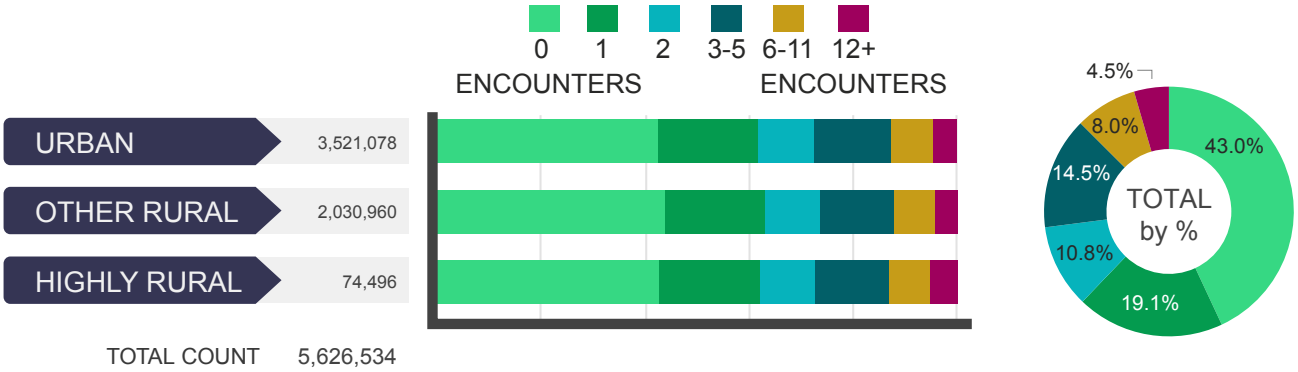
IMPLICATIONS Differences in VA emergency department use by rural/urban status can largely be explained by the proximity to VA emergency departments. Most rural and highly rural Veterans live considerable distances from VA medical centers where emergency departments are located, and therefore they would be expected to have lower VA emergency department utilization rates. However, without information on non-VA community emergency department utilization, it cannot be determined how rural and urban Veterans use emergency department services overall, or whether their emergency department use leads to differences in outcomes.

Telephone Encounters[15] by Rural/Urban Status

There was a slightly higher rate for the highest number of telephone encounters (12+) among highly rural Veterans (5.4%) compared to the telephone encounter rates for rural (4.4%) and urban (4.6%) populations *(Exhibit 6-10)*. However, in general, rates of telephone encounters by rural/urban status were largely the same.

EXHIBIT 6-10

PERCENT DISTRIBUTION OF TELEPHONE ENCOUNTERS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

IMPLICATIONS Overall, it appears as though use of telephone visits to address concerns which do not require an in-person visit are utilized similarly regardless of rural/urban location. However, this data does not reflect telehealth utilization rates, which are higher in rural areas than in urban areas.[16] Further, understanding that rural Veterans use telehealth more frequently than urban Veterans suggests an important emphasis going forward will be to find ways to overcome connectivity issues in rural communities.

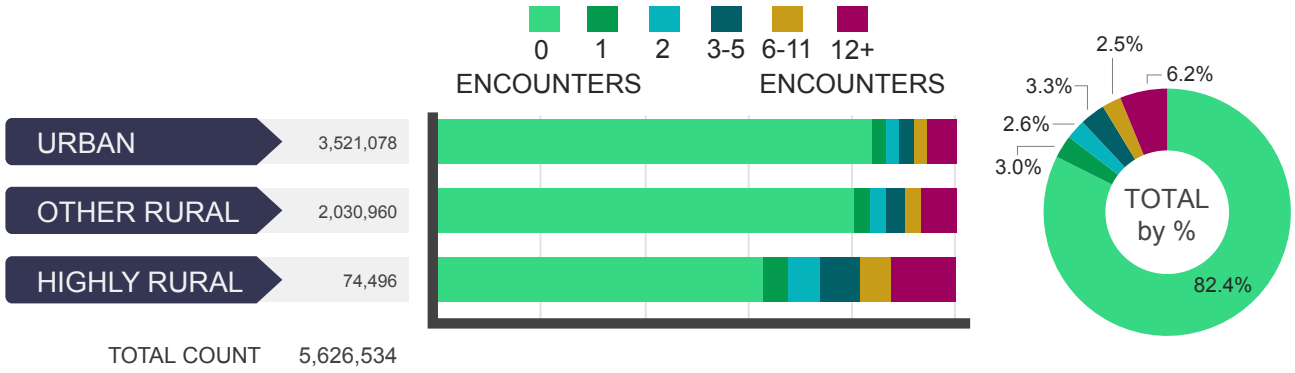
15 Telephone encounters include only encounters over the phone with a clinician, but not formal telehealth encounters.
16 VHA Support Services Center (VSSC). Telehealth workload cube. Retrieved July 7, 2015.

Fee Outpatient Services[17] by Rural/Urban Status

Rural and urban Veterans were most likely to have no fee-based outpatient service use in the past year, with 80.6% and 83.9% respectively *(Exhibit 6-11)*. However, highly rural Veterans had higher rates of fee service use across all other service use categories. For example, 12.4% of highly rural Veterans used 12+ fee based services in the past year, while a smaller percent of rural and urban Veterans (6.8% and 5.7%, respectively) had that level of fee-based service use.

EXHIBIT 6-11

PERCENT DISTRIBUTION OF FEE OUTPATIENT SERVICES ENCOUNTERS BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13



Missing = 25,537.

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

IMPLICATIONS Veterans living in highly rural areas were the most likely to receive fee-based care. This is not surprising given the long distances to VA facilities for many of these Veterans. Use of fee outpatient services is likely to increase with the implementation of the Veterans Access, Choice and Accountability Act of 2014 which is intended to improve access by utilizing non-VA community providers. The supply of community providers in rural communities is a long standing issue in the delivery of care to rural populations and will likely remain a significant access issue into the future.

17 Fee services include Non-VA community care that was reimbursed by VA.

Section IV: Conditions

Diagnosed Conditions Categories by Rural/Urban Status

The five leading categories of diagnosed conditions were the same among highly rural, rural, and urban Veterans. Endocrine, metabolic, and nutritional disorders were the most common diagnosed conditions across all three geographic classifications; cardiovascular illnesses were the second most common category of diagnosed conditions, followed by musculoskeletal, sense organ, and gastrointestinal categories *(Exhibit 6-12)*. It is not surprising that these categories of diagnosed conditions are largely similar among rural and urban Veteran populations, as many of the issues facing rural health are less about rates of morbidity than about disparities in health outcomes and quality of life as impacted by access to care and other social determinants of health.

EXHIBIT 6-12

PERCENT IN DIAGNOSED CONDITIONS CATEGORIES BY RURAL/URBAN STATUS AMONG VETERAN VHA PATIENTS, FY13

	Highly Rural	Other Rural	Urban	TOTAL
Count	74,4 96	2,030,960	3,521,078	5,626,534
Condition	%	%	%	%
Infectious Disease	17.3	19.4	22.4	21.3
Endocrine/Metabolic/ Nutritional	63.1	67.4	61.7	63.7
Cardiovascular	60.4	64.3	58.6	60.7
Respiratory	28.6	28.7	26.7	27.5
Gastrointestinal	35.0	36.5	33.7	34.7
Urinary	15.6	16.3	16.5	16.4
Reproductive Health	23.7	24.7	24.5	24.6
Breast	0.7	0.6	0.8	0.8
Cancer	10.7	10.6	10.0	10.2
Hematologic/Immunologic	8.9	10.1	10.7	10.4
Musculoskeletal	50.2	50.9	49.2	49.9
Neurologic	23.1	24.1	24.5	24.3
Mental Health/SUD	27.3	31.5	34.4	33.3
Sense Organ	41.3	43.5	42.2	42.6
Dental	6.8	7.5	8.7	8.2
Dermatologic	22.4	22.0	21.8	21.9
Other	45.8	46.7	46.9	46.8

Missing = 25,537

Denominator: All Veterans who used any VHA care in FY13 (VHA outpatient care, inpatient care, pharmacy care, or Non-VA [Fee] Medical Care), referred to as "Veteran FY13 VHA patients" (Data source: WHEI Master Database).

Source: VHA National Health Equity Report 2016

Individual Diagnosed Conditions by Rural/Urban Status

Exhibit 6-13 contains individual diagnosed conditions by rural and urban status and is available in the supplemental materials *(Exhibit 6-13)*.

Similarly and as expected, there were also not vast differences between rural and urban Veterans in the rates of individual conditions within these categories *(Exhibit 6-13)*. For some conditions, rural Veterans had lower diagnosis rates, while for other conditions, rural Veterans had a slightly higher percent diagnosed. Again, this is reflective of trends among rural and urban populations more generally, where there is little evidence to show stark differences in rates of morbidity or chronic conditions.[18] Instead, a more compelling issue is the potential for differences in health outcomes or treatments among these conditions as a reflection of differences in care received that is dependent on geographic location. Those types of comparisons are beyond the scope of this report, but should continue to be a part of the rural health services research agenda.

Infectious Disease

For HIV/AIDs, rural and highly rural Veterans had lower overall rates of diagnosed infection (0.1% and 0.2% respectively) compared to urban Veterans, who had rates of 0.6%. Rural and highly rural Veterans also had lower rates of Mycoses than their urban counterparts, with 3.9% (highly rural), 5.7% (rural) and 6.5% (urban) diagnosed, respectively *(Exhibit 6-13)*.

IMPLICATIONS Although the count data provided here suggest lower rates of HIV/AIDs in rural populations, it is likely the case that there are other explanations for this difference. For example, studies have shown that rural residents are less likely to have HIV testing in the prior year,[19] which could lead to overall fewer diagnoses. Similarly, rurality has been shown to be associated with delayed care entry for HIV,[20] suggesting that instead of these data indicating differences in overall disease rates, they may instead point to differences in care seeking behavior.

18 Eberhardt MS & Pamuk ER. The importance of place of residence: Examining health in rural and non-rural areas. *Am J Public Health.* 2004;94(10),1682-1686.

19 Ohl ME & Perencevich E. Frequency of human immunodeficiency virus (HIV) testing in urban vs. rural areas of the United States: Results from a nationally-representative sample. *BMC Public Health.* 2011;11(681),1-7.

20 Ohl M, Tate J, Duggal M, Skanderson M, Scotch M, Kaboli P, Vaughan-Sarrazin M, & Justice A. Rural residence is associated with delayed care entry and increased mortality among veterans with immunodeficiency virus infection. *Medical Care,* 2010;48(12),1064-1070.

Endocrine/Metabolic/Nutritional

Slight differences were seen between rural and urban Veterans in rates of endocrine/metabolic/ nutritional disorders. In FY13, Veterans who fell into the rural classifications had diabetes rates of approximately 25% whereas their urban counterparts were 23.1%. Rural Veterans had higher rates of lipid disorders (51.9% versus 44.8% for urban Veterans) and thyroid disorders (8.6%, 7.7% and 7.0%, for highly rural, rural, and urban Veterans, respectively). However, highly rural Veterans had lower rates of overweight/obesity (11.5%) than both their rural (15.8%) and urban counterparts (15.4%). This trend was also seen with Vitamin D Deficiency, where rates ranged from 3.2% in highly rural Veterans, to 4.3% in rural Veterans and up to 4.6% in urban Veterans *(Exhibit 6-13)*.

IMPLICATIONS Prior research has suggested that rural populations have higher crude prevalence rates of diabetes, suggesting that many risk factors such as poverty, obesity, and tobacco use play a role in this trend.[21, 22] The tables presented above show a slightly higher prevalence of diabetes among rural Veterans than among urban Veterans, but this trend does not extend to the highly rural Veteran population. Additionally, highly rural Veterans actually had lower rates of diagnosed overweight/ obesity than both rural and urban Veterans, which could suggest why they had lower rates of diabetes. Overall it is unclear why highly rural Veterans do not follow the predicted population pattern of higher rates of diagnosed diabetes than urban populations. This difference could be artificial due to the rurality classification used in the FY13 enrollment files or it could suggest behavioral or lifestyle differences between geographic locations.

Cardiovascular

Within the category of cardiovascular diseases, rural Veterans tended to have higher rates of both hypertension and coronary artery disease than both their highly rural and urban counterparts. In the case of hypertension, 54.4% of the rural population had this diagnosis compared to 49.2% of highly rural Veterans and 49.3% of urban Veterans. For coronary artery disease, 18.2% of rural Veterans had the diagnosis in FY13, compared to 15.9% of highly rural and 14.7% of urban patients *(Exhibit 6-13)*.

IMPLICATIONS These data suggest that rural patients have higher rates of hypertension and coronary artery disease than their urban counterparts. This is important because historically rural patients have also had higher death rates from cardiovascular disease than their urban counterparts.[21] Further, it is often harder for these rural patients to obtain services to help treat or recover from cardiovascular illness, such as cardiac rehabilitation, due to limited access to locally available rehabilitation care and travel burden.[23] Going forward, this suggests an important avenue where home-based models of care delivery may help address this gap in treatment provision for rural Veterans.[23]

21 Eberhardt MS & Pamuk ER. The importance of place of residence: Examining health in rural and non-rural areas. *Am J Public Health.* 2004;94(10),1682-1686.

22 O'Connor A & Wellenius G. Rural-urban disparities in the prevalence of diabetes and coronary heart disease. *Public Health,* 2012;126(10),813-820.

23 Wakefield B, Drwal K, Scherubel M, Klobucar T, Johnson S, & Kaboli PJ. Feasibility and effectiveness of remote, telephone-based delivery of cardiac rehabilitation. *Telemedicine Journal and e-Health.* 2014;20(1),32-38.

Respiratory

While many of the rates of pulmonary illness did not differ between rural and urban patients, there were higher rates of chronic obstructive pulmonary disease (COPD) among highly rural (11.4%) and rural (11.3%) Veterans compared to urban Veterans (8.1%) *(Exhibit 6-13)*.

IMPLICATIONS Similar to rural population rates more generally,[24] COPD impacts rural Veterans at higher rates than urban Veterans. Additionally, those rural Veterans who have COPD have been found to have higher rates of mortality from the illness compared to their urban counterparts.[25] Efforts to understand the risk factors driving the higher rate of COPD in rural Veterans could help point to appropriate interventions.

Gastrointestinal

Among the gastrointestinal conditions, rural Veterans had the highest rates of esophageal disorders (20.3%) compared to both their highly rural (18.3%) and urban (16.4) counterparts. Additionally, rural and highly rural Veterans had slightly higher rates of colorectal polyps (6.5% and 6.4% respectively), compared with urban patients (5.7%). Lastly, rural and highly rural Veterans had slightly lower rates of hepatitis C (1.8% and 1.6%, respectively) than urban Veterans (3.0%) *(Exhibit 6-13)*.

IMPLICATIONS Although it is unclear why rural Veterans might have higher rates of esophageal disorders than their urban counterparts, it is possible that differences in social factors or life stressors are contributing to differing rates of gastrointestinal disorders.[26] This is an area where further exploration is needed. For the differing rates in colorectal polyps, it is not entirely clear which factors could be driving these rates, although there have been some studies which suggest that rural residents are at increased risk for colon cancer.[27] However, it is likely that differences in screening rates between urban and rural residents can explain at least part of the association in cancer rates.[28] Going forward it will be important to understand how increasing screening rates might change this relationship. Lastly, for hepatitis C, it makes sense to see a higher rate in urban, as this particular illness is largely spread through injection drug use (which also occurs at a higher rate in urban areas).[29]

24 Eberhardt MS & Pamuk ER. The importance of place of residence: Examining health in rural and non-rural areas. *Am J Public Health.* 2004;94(10),1682-1686.

25 Abrams T, Vaughan-Sarrazin M, Fan VS, & Kaboli PJ. Geographic isolation shows higher risk for chronic obstructive pulmonary-disease related mortality: A cohort study. *Office of Rural Health Issue Brief*. 2012;1-3.

26 Chang L, Toner BB, Fukudo S, Guthrie E, Locke GR, Norton NJ, & Sperber AD. Gender, age, society, culture, and the patient's perspective on the functional gastrointestinal disorders. *Gastroenterology.* 2006;130(5),1435-1446.

27 Kinney AY, Harrell J, Slattery M, Martin C, & Sandler RS. Rural-urban differences in colon cancer risk in blacks and whites: The North Carolina colon cancer study. *Journal of Rural Health.* 2007;22(2),124-130.

28 Cole AM, Jackson JE, & Doescher, M. Urban-rural disparities in colorectal cancer screening: Cross-sectional analysis of 1998-2005 data from the Centers for Disease Control's behavioral risk factor surveillance study. *Cancer Medicine.* 2012;1(3),350-356.

29 Hellard M, McBryde E, Davis RS, Rolls DA, Higgs P, Aitken C, Thompson A, Doyle J, Pattison P, & Robins G. (2015). Hepatitis C transmission and treatment as prevention - the role of the injecting network. *International Journal of Drug Policy, (epub ahead of print)*.

Urinary

Few differences were seen between rural and urban Veterans in the renal-urinary category. Only a slight difference was found among those with renal failure or nephropathy, with 6.0% of highly rural Veterans having this condition, compared to 6.8% of rural and 7.1% of urban Veterans *(Exhibit 6-13)*.

IMPLICATIONS Currently, it appears as though differences between rural and urban Veterans on urinary conditions are small. Additionally, research has suggested that treatment and health outcomes for rural populations with renal disease are comparable to urban populations.[30, 31]

Reproductive Health

In FY13, rates of reproductive health issues were relatively low across the entire Veteran population. Only two conditions in this category had noteworthy difference between rural and urban Veterans, including male genital disorders (with rates at 13.4% of rural and highly rural Veterans compared to 11.8% in urban Veterans) and sexual dysfunction (5.9% in highly rural, 7.5% in rural, and 7.6% in urban, respectively). Female specific disorders were largely similar across geographic categories *(Exhibit 6-13)*.

IMPLICATIONS The differences noted above are relatively small and are likely due in part to differences in demographic distributions between the populations, since this data does not control for the larger proportion of older males in rural areas.

Breast

Rates of breast conditions were low across the entire population and did not show any notable differences between rural and urban Veterans *(Exhibit 6-13)*.

IMPLICATIONS The rates of breast conditions between rural and urban Veteran populations appear to be very similar. However, research suggests that rural populations often face disparities in breast cancer screening[32] and treatment provision.[33] Therefore, efforts to explore issues related to breast conditions should consider potential differences in treatment patterns by rurality to ensure rural Veterans are receiving high quality care.

30 Axelrod DA, Guidinger MK, Finlayson S, Schaubel DE, Goodman DC, Chobanian M, & Merion RM. Rates of solid-organ wait-listing, transplantation, and survival among residents of rural and urban areas. *JAMA.* 2008;299(2),202-207.

31 O'Hare AM, Johansen KL, & Rodriguez RA. Dialysis and kidney transplantation among patients living in rural areas of the United States. *Kidney International.* 2006;69,343-349.

32 Doescher MP & Jackson EJ. Trends in cervical and breast cancer screening practices among women in rural and urban areas of the United States. *Journal of Public Health Management & Practice.* 2009;15(3),200-209.

33 Haggstrom DA, Quale C, & Smith-Bindman R. Differences in the quality of breast cancer care among vulnerable populations. *Cancer.* 2005;104(11),2347-2358.

Cancer

There were no notable differences between rural and urban Veterans in cancer diagnoses *(Exhibit 6-13)*.

IMPLICATIONS Rates of diagnosed cancer between rural and urban populations were similar. However, more importantly, rural patients often face more significant barriers to receiving the same cancer treatment as their urban peers, due to barriers such as travel and cost.[34] Perhaps as a product of this increased burden of accessing care, rural cancer patients often have worse outcomes following a cancer diagnosis, including higher mortality than urban patients.[35, 36] These issues highlight the importance of exploring differences between rural and urban populations in how care is delivered, and subsequent impacts on the quality of care.

Hematology / Immunology

There were slightly lower rates of diagnosed anemia among highly rural Veterans, with highly rural rates at 5.5%, rural at 6.9% and urban at 7.6% *(Exhibit 6-13)*.

IMPLICATIONS Others have found that rates of anemia typically increase with age.[37] Given that rural populations also tend to be older than their urban counterparts, future evaluations should explore the causes for the differences in diagnosed anemia rates that we observed.

Musculoskeletal

Rural and urban Veterans had similar rates of diagnoses for most musculoskeletal disorders *(Exhibit 6-13)*.

IMPLICATIONS Despite higher rates of unintentional injuries in rural populations,[38] there are similar rates of musculoskeletal disorders in general among rural and urban Veterans.

34 Baldwin LM, Cai Y, Larson EH, Dobie SA, Wright GE, Goodman DC, Matthews B, & Hart LG. Access to cancer services for rural colorectal cancer patients. *Journal of Rural Health.* 2008;24(4),390-409.

35 Eberhardt MS & Pamuk ER (2004). The importance of place of residence: Examining health in rural and nonrural areas. *Am J Public Health.* 2004;94(10),1682-1686.

36 Weaver KE, Geiger AM, Lingyi L, Case LD. Rural-urban disparities in health status among US cancer survivors. *Cancer.* 2013;119(5),1050-1057.

37 Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, & Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: Evidence for a high rate of unexplained anemia, *Blood.* 2004;104(8),2263-2268.

38 Eberhardt MS & Pamuk ER (2004). The importance of place of residence: Examining health in rural and nonrural areas. *Am J Public Health.* 2004;94(10),1682-1686.

Neurological

There were also no notable differences among the rural and urban Veteran population for the conditions included in the neurological category *(Exhibit 6-13)*.

IMPLICATIONS Although disparities in treatment among neurological disorders such a stroke have been identified as an issue in the literature,[39] there were no observable differences between the rate of neurological conditions occurring among rural and urban Veterans. However, given rural/urban disparities in care for conditions such as stroke, future evaluations should explore rural/urban populations differences in health outcomes related to all neurological disorders.

Mental Health / Substance Use Disorder

Across many of the mental health diagnoses, highly rural Veterans had the lowest rates of diagnosed conditions. For example, for major depressive disorder, 4.0% of highly rural Veterans, 5.3% of rural, and 6.3% of urban Veterans had this diagnosis. This was also the case for the depression, possible-other (13.1% highly rural, 15.6% rural and 16.3% urban), PTSD (10.8% highly rural, 12.1% each in rural and urban), anxiety disorders-other (6.0% highly rural, 8.8% rural, and 9.3% in urban), adjustment disorders (1.4% highly rural, 2.2% rural, 2.8% urban), bipolar disorders (1.5% highly rural, 1.9% rural, and 2.6% urban), alcohol use disorders (5.6% highly rural, 6.0% rural, and 7.7% urban), and drug use disorders (2.1% highly rural, 3.0% rural, and 5.2% urban) *(Exhibit 6-13).*

IMPLICATIONS This lower rate of diagnosed mental health disorders among highly rural Veterans is consistent with other research which found the rates of these conditions to be lower in rural areas.[40] However, as suggested by the mental health/substance use disorder utilization section (Exhibit 6-13), it is likely that these mental health diagnoses are lower due to differences in treatment seeking behaviors and access to mental health care, rather than to lower morbidity in rural areas. Several studies have documented rural disparities in mental health care access and treatment seeking, such as those which have shown that rural populations have higher rates of depressive symptoms[41, 42] and higher rates of suicide.[43] Moreover, higher rates of stigma in seeking mental health treatment are found in the most rural areas,[40] further exacerbating this issue. In addition, research has also suggested that the amount and type of treatment provided to those living in rural areas often differs significantly from that for urban residents.[44] Additional work is needed to identify and implement interventions to address mental health care for rural populations.

39 Leira EC, Hess DC, Torner JC, & Adams HP. Rural-urban differences in acute stroke management practices: A modifiable disparity. *JAMA, Neurology.* 2008;65(7),887-891.

40 Wallace AE, Weeks WB, Wang S, Lee AF, & Kazis LE. Rural and urban disparities in health-related quality of life among veterans with psychiatric disorders. *Psychiatr Serv.* 2006;57(6),851-856.

41 Dobalian A, Tsao JC, & Radcliff TA. Diagnosed mental and physical health conditions in the United States nursing home population: Differences between urban and rural facilities. *Journal of Rural Health.* 2003;19(4),477-483.

42 Hoyt DR, Conger RD, Valde JG, & Weihs K. (1997). Psychological distress and help seeking in rural America. *Am J Community Psychol.* 1997;25(4),449-470.

43 Eberhardt MS & Pamuk ER. The importance of place of residence: Examining health in rural and nonrural areas. *Am J Public Health.* 2004;94(10),1682-1686.

44 Petterson SM. Metropolitan-nonmetropolitan differences in amount and type of mental health treatment. *Arch Psychiatr Nurs.* 2003;17(1),12-19.

Sense Organs

Among conditions of the sense organs, the highly rural Veterans had lower rates of refraction disorders (15.0%) compared to both rural (18.9%) and urban (18.8%) Veterans. This trend was also seen among glaucoma rates, with 5.1% highly rural, 7.0% rural and 8.3% urban Veterans receiving this diagnosis. Rural Veterans had the highest rates of cataract diagnoses at 17.6% (compared to 15.4% in highly rural and 16.1% in urban). Lastly, rural and highly rural Veterans had higher rates of hearing problems (approximately 19%) compared to urban Veterans (16.7%) *(Exhibit 6-13)*.

IMPLICATIONS While it is unclear why there might be lower rates of glaucoma and refraction disorders among rural Veterans, the association seen with higher rates of hearing problems in rural Veterans could be reflective of the overall demographic profile of rural Veterans, as older populations have higher rates of hearing loss.[45] Hearing loss continues to be an issue of concern to the entire Veteran population (due to increased noise exposure during military service), and efforts to address additional modifiable risks for hearing loss should focus on additional exposures experienced by rural populations, including occupational and other civilian exposures.[46] Similarly, the higher rate of cataracts among rural Veterans likely also reflects the aging rural population, as older populations typically have higher rates of cataracts.[47] For this reason, efforts to ensure adequate access to surgeries and treatment for cataracts in rural Veterans will continue to be an important issue.

Dental

Across all dental diagnoses, highly rural Veterans had lower rates than their rural and urban counterparts. For example, 4.4% of highly rural Veterans had dental caries, while 4.9% of rural and 5.5% of urban Veterans had caries *(Exhibit 6-13)*.

IMPLICATIONS Although research has suggested that those living in rural areas have higher rates of unmet dental needs, including fewer visits, more caries, and higher rates of lost teeth,[48] this trend is not seen in this data. This could be due to a number of factors including the small number of Veterans who receive VA dental care, and differences in rates of coverage for dental procedures outside of VA. However, due to the importance of oral health continued efforts to evaluate this area will be an important focus for VA going forward.

45 Agrawal Y, Platz EA, & Niparko JK. Prevalence of hearing loss and differences by demographic characteristics among US adults: Data from the National Health and Nutrition Examination Survey, 1999-2004. *JAMA, Internal Medicine,* 2008;168(14),1522-1530.
46 Saunders GH & Griest SE. Hearing loss in veterans and the need for hearing loss prevention programs. *Noise & Health.* 2009;11(42),14-21.
47 Congdon N, et al. Prevalence of cataract and Pseudophakia/Aphakia among adults in the United States. *JAMA, Ophthalmology.* 2004;122(4),487-494.
48 Vargas CM, Dye BA, & Hayes KL. Oral health status of rural adults in the United States. *JADA.* 2002;133(12),1672-1681.

Dermatologic

Rates of dermatologic issues were similar among rural and urban Veterans *(Exhibit 6-13)*.

IMPLICATIONS Rates of dermatologic issues appear to be largely similar by rural/urban status; however some research has suggested that rural residents may be less likely to take part in skin protective behaviors, such as using sunscreen.[49] Efforts to prevent skin cancers and other skin disorders could focus on these protective behaviors.

Other

Among the other issues included in this data, highly rural and rural Veterans had lower rates of housing insufficiency (1.3% for rural and highly rural compared to 4.2% in urban) *(Exhibit 6-13)*.

IMPLICATIONS While these data suggest that rural residents are not at higher risk for homelessness, this could be due in part to the measurement issues which often fail to appropriately account for homelessness in rural areas.[50] Further, differences in reasons for homelessness between rural and urban populations are of importance. For example, rural homeless populations tend to have issues with housing due to economic reasons or lack of adequate housing stock, instead of due to mental health or substance abuse issues.[51] Additionally, rural homeless populations tend to be more educated, younger, and are more likely to be women with children and single women.[52] Although this data suggests that rural Veterans are not at higher risk for homelessness, issues surrounding measurement of homelessness in rural areas as well as consideration of differential barriers to achieving stable housing will be important areas of focus going forward.

49 Zahnd WE, Goldfard J, Scaife SL, & Francis ML. Rural-urban differences in behaviors to prevent skin cancer: An analysis of the Health Information National Trends Survey. *J Am Acad Dermatol.* 2010;62(6),950-956.

50 Health Resources and Services Administration. (2014). Homelessness in rural America. *National Advisory Committee on Rural Health and Human Services Policy Brief*.

51 First RJ, Rife JC, & Toomey BG. Homelessness in rural areas: Causes, patterns, and trends. *Social Work.* 1994;39(1),97-108.

52 Vargas CM, Dye BA, & Hayes KL. Oral health status of rural adults in the United States. *JADA.* 2002;133(12),1672-1681.

Section V: Conclusions

Overall, the distribution of diagnosed conditions between rural and urban Veterans are largely similar, with rural Veterans having higher diagnosed rates of some conditions (e.g., diabetes and COPD) while urban Veterans have higher diagnosed rates of other conditions (e.g., HIV and Hepatitis C). In this way, we can see that rural residence does not necessarily result in a diagnosed disease prevalence disparity. However, disparities in health outcomes are largely a result of geographic differences in delivery of and access to quality care, which encompasses differences in prevention, diagnosis, screening, outreach, and clinical service delivery. For example, rural/urban differences in treatment patterns have been described for a variety of disorders such as coronary artery disease, stroke, and breast cancer. Prior studies have also found lower screening rates for colorectal cancer and lower rates of mental health treatment. These and the many other examples discussed above suggest that understanding how rurality impacts health goes beyond exploring rates of health conditions, and should explore differences in health outcomes, in treatment provision, and in health behaviors, to name a few. By exploring rurality through a broader array of health measures, we could start to see how interventions and health care must be adapted to bring rural residents the same high quality care as their urban counterparts.

In sum, rural residence does not always suggest that a disparity exists. Instead, rural residence suggests that there could be differences in how health services are delivered, received, and adopted. In addition to work around other social determinants of rural Veterans' health, understanding and addressing the variety of disparities that can result from these differences in care is the challenge for future research, policy, and practice in rural health.

There are several limitations of this chapter to note. First, this chapter provides only count data for the demographics, utilization, and individual conditions listed. While this count data can provide a springboard from which to start to examine areas of rural health care that may require additional attention, it does not provide the detailed look required to see many of the disparities in care rural Veterans face. These disparities are often seen in data such as differential health outcomes for the same illness or increased burden of travel to receive care, as two examples. For this reason, it is important to interpret the numbers in this report with this in mind and remember that the lack of a difference in rates seen in many of these illnesses is not suggesting that rural and urban Veterans are equal in health care access, but instead shows that, as expected, the rates of many diseases are similar across populations.

Additionally, the counts and rates included in this chapter reflect only diagnoses and visits which are documented in VA records. It is possible, and likely, that many Veterans are receiving care outside of the VA and that information is not included here. This should be considered when reviewing the rates and utilization information provided in previous sections.

Lastly, this chapter does not include data on many other social determinants that could be important to rural Veterans. For example, many issues facing rural Veterans are a result of provider shortages, lack of available education, training and employment, issues with health literacy, poverty, transportation, and other psychosocial factors which can make rural residence a barrier to accessing care and remaining healthy. These issues also merit research and policy, but are beyond the scope of the data provided here.