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Findings Brief
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Utilization of Inpatient and Emergency Services by Rural and Urban Medicaid Enrollees

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BACKGROUND AND PURPOSE

In 2021, more than 82 million Americans were insured by Medicaid and the Children's Health Insurance Program (CHIP), with both programs covering between 10% to 37% of each state's population.[1] People living in rural areas are even more likely to be enrolled in Medicaid than those living in urban areas, making Medicaid a vital component of health care access in rural America.[2] While prior studies have compared the health care utilization of Medicaid enrollees within one or several states, less is known about health care utilization in the national rural Medicaid population when compared to the national urban Medicaid population. Understanding any disparities between urban and rural Medicaid populations is particularly important for improving health equity because the specific populations it serves—children, pregnant people, the aged, the disabled, and low-income individuals. The purpose of this brief is to describe health care utilization among rural Medicaid beneficiaries at the national level and to compare these results to utilization among urban Medicaid beneficiaries.

METHODS

For this study, we used data from the 2019 Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF) and focused on inpatient and emergency department (ED) health care. The 2019 files are pre-COVID-19, and thus do not reflect any changes in health care utilization due to the pandemic. The TAF include comprehensive information about the demographics, eligibility, health care spending and health care utilization for Medicaid and CHIP enrollees.[3] T-MSIS data have not been widely used by researchers, so a secondary aim of this brief is to expand on prior evaluations of T-MSIS data quality for rural analyses.[4] We limited our analysis to months where enrollees had full, as opposed to partial, coverage. All states and Washington, D.C. were included in analysis except for Idaho, where code values indicated more than 90% of its enrollees lacked full coverage,[5] and Rhode Island, where missing ZIP Codes meant we could not assign beneficiaries to Rural Urban Commuting Area (RUCA) types.

We used two definitions of rurality to compare urban and rural populations, based on their residence: RUCA codes and Frontier and Remote (FAR) area codes. RUCA codes, which are published by the U.S.

KEY FINDINGS

- Overall utilization by Medicaid enrollees, as measured by number of emergency department (ED) visits, number of inpatient admissions, inpatient length-of-stay, and inpatient readmission rate, is higher in urban areas than in rural areas.
- Among enrollees who are at least 65 years old most of whom had Medicare-Medicaid dual eligibility, *rural* Medicaid enrollees had higher rates of inpatient admissions and ED visits than urban enrollees, while among those in the age categories of below 18 and 18-64 years old, *urban* enrollees had higher rates. Readmission rates and average inpatient length-of-stay were higher in urban enrollees across all age categories.
- Non-Hispanic Black enrollees had the highest utilization rates compared to enrollees that were non-Hispanic White, and Hispanic of any race. Hispanic enrollees of any race had the lowest utilization rates. Utilization was lowest in Isolated Rural areas, and often highest in Large Rural areas.
- Rural female enrollees (except those in Isolated Rural areas) had higher rates of ED use compared to urban enrollees, while rural male enrollees had lower ED utilization than those in urban areas. Compared to urban rates, male and female enrollees in rural areas had a shorter inpatient lengths-of-stay and lower readmission rates.

Department of Agriculture's (USDA) Economic Research Service (ERS), assigns each census tract a value from 1 to 10 based on population density and commuting flow, with 1 being the most urban.[6] These tract-based RUCA classifications are then used to approximate ZIP Code-level classifications based on the ZIP Codes within each census tract. These codes are then grouped into subcategories of Metropolitan (RUCA 1-3), Micropolitan (4-6), Small Town (7-9), and Rural Areas (10).[6] To distinguish between Rural Areas according to RUCA code and rural areas in general, we relabeled Micropolitan as Large Rural, Small Town as Small Rural, and Rural Area as Isolated Rural, following our approach in previous briefs.[7,8] Urban ZIP Codes have no FAR code, and rural ZIP Codes either have no FAR code or are classified into one or more codes of 1 through 4 based on size and proximity to urban areas, with 4 having the most restrictive criteria for remoteness.[9] For this study, we classified ZIP Codes according to their highest (most isolated) FAR code.

We compared urban and rural Medicaid enrollees across four outcomes: number of acute inpatient admissions (inpatient stays), inpatient length-of-stay, acute readmissions, and number of ED visits. All enrollees with at least one month of full Medicaid coverage were included in the study sample, though for those without continuous full coverage throughout all 12 months, only the months with full coverage were included. Both the number of inpatient stays and number of ED visits are calculated as the rate per 1,000 member years. Average length of stay is defined as the total number of inpatient days/total number of inpatient stays. Readmission rates are calculated as the proportion of acute inpatient stays that result in acute readmission within 30 days of discharge. Results are presented by rurality, age, sex, and race/ethnicity. Prior evaluation has raised concerns about the quality of T-MSIS data on enrollee race and ethnicity from many states, so for this study we presented results in broader categories of non-Hispanic White, non-Hispanic Black, and any race with Hispanic.[10] As data quality improves, better research can be conducted on finer categorizations of race.

RESULTS

Overall

Table 1 shows national health care utilization, as well as utilization by RUCA and FAR codes. Given the sample sizes, nearly every difference is statistically significant. Across the first two metrics, utilization was lower in Isolated Rural areas and Metropolitan areas and highest in Large Rural areas and Small Rural areas. Both inpatient length-of-stay and readmission rates were highest in Metropolitan areas. When using both RUCA and FAR codes, the most remote areas (RUCA: Isolated Rural, FAR code: 4) had the lowest rates of utilization for all metrics except for length-of-stay (where FAR code 4 had slightly longer length-of-stay than FAR code 3 and 1) and readmission rates (where FAR code 3 and 4 are the same and have higher readmission rates than FAR code 1 and 2). Using both RUCA and FAR codes result in the same pattern of roughly decreasing utilization across the rural continuum. For simplicity, for the rest of the brief, results are only shown using RUCA codes, as the general patterns of levels of rurality were consistent between the FAR-based and RUCA-based analyses.

Table 1. Health Care Utilization by Rurality of Enrollee Residence

RUCA Category	ED Visits per 1,000 member years	Inpatient Stays per 1,000 member years	Average Length of Stay (Days)	30-day Readmission Rate
Metropolitan	693.57	124.52	5.8	13.67%
Large Rural	790.06	127.60	5.4	10.55%
Small Rural	773.07	128.36	5.4	10.11%
Isolated Rural	658.27	120.99	5.3	9.98%
FAR Code				
0	706.11	124.95	5.7	13.24%
1	723.07	125.23	5.1	9.79%
2	708.48	129.78	5.4	9.71%
3	691.89	119.76	5.1	9.87%
4	600.80	116.32	5.2	9.87%
All Enrollees	**705.51**	**124.89**	**5.7**	**13.10%**

By Age

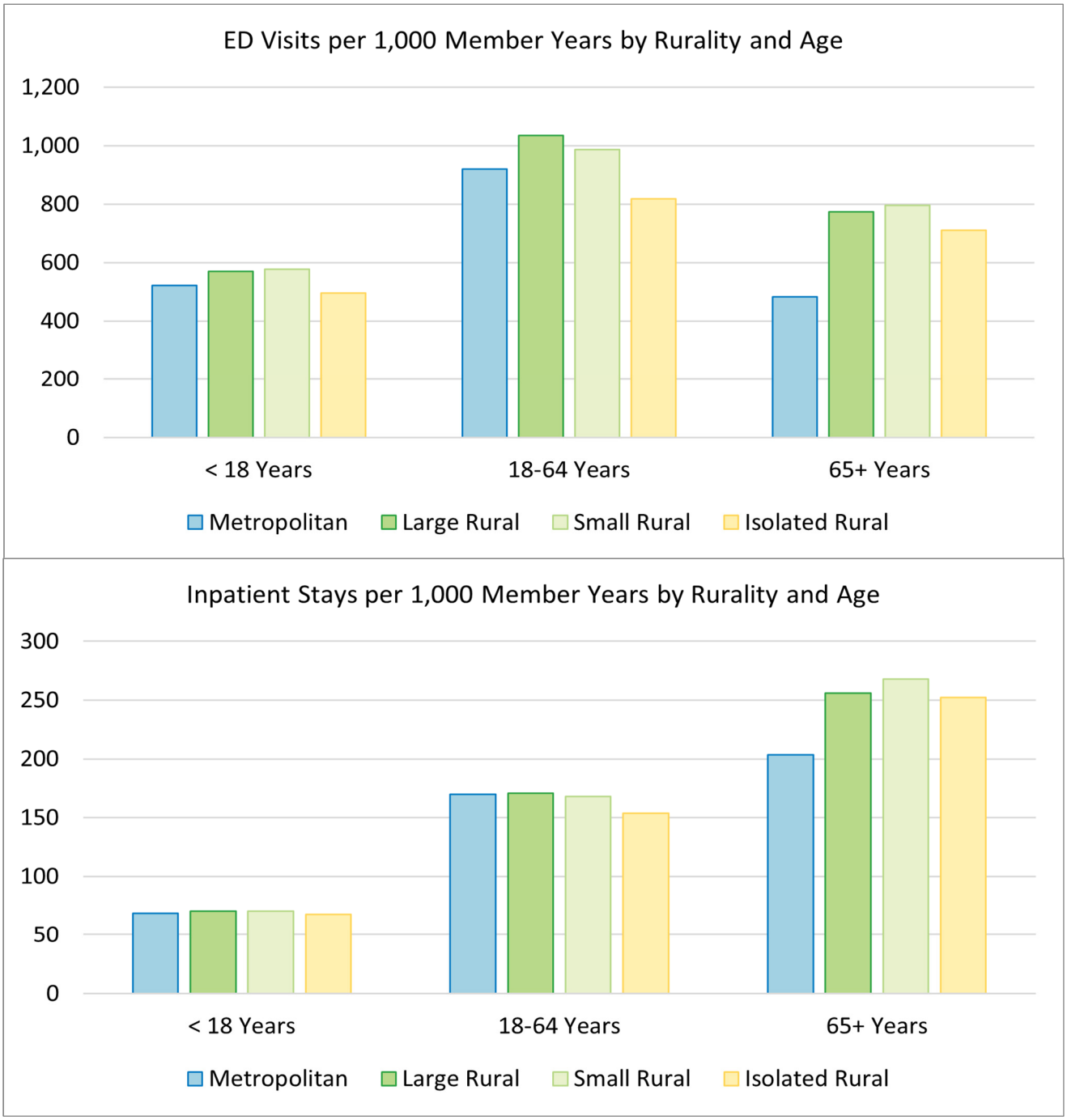
Across a population, we would expect to see health care utilization increasing with age. With Medicaid, however, children and the elderly can qualify based on income alone, while non-elderly adults must meet certain categorical eligibility criteria in states that have not expanded Medicaid, which include being disabled, being pregnant or post-partum, or being a parent or caretaker. Two of these categories—disability and pregnant/post-partum—are associated with higher health care utilization than the average American adult. Therefore, the results in Table 2, which indicate that utilization is higher in the 18-64 age category than in 65+ category for some metrics, are not unexpected.

Table 2. Health Care Utilization by Age

RUCA	<18 Years	18-64 Years	65+ Years
ED Visits per 1,000 Member Years			
Metropolitan	522.04	919.67	483.52
Large Rural	570.13	1,034.8	773.32
Small Rural	576.86	986.49	796.19
Isolated Rural	494.92	818.29	710.12
All Enrollees	528.57	930.92	526.53
Inpatient Stays per 1,000 Member Years			
Metropolitan	68.77	170.03	203.60
Large Rural	70.53	170.80	255.81
Small Rural	70.27	167.99	267.73
Isolated Rural	67.78	153.63	252.07
All Enrollees	68.98	169.54	211.90
Inpatient Length of Stay (Days)			
Metropolitan	4.9	5.9	6.8
Large Rural	4.7	5.5	6.2
Small Rural	4.8	5.4	6.2
Isolated Rural	4.8	5.3	6.1
All Enrollees	4.9	5.8	6.7
30-Day Readmission Rate (Percentage)			
Metropolitan	6.25%	17.43%	11.05%
Large Rural	5.37%	13.10%	8.18%
Small Rural	5.26%	12.89%	8.12%
Isolated Rural	5.93%	12.32%	8.20%
All Enrollees	6.11%	16.71%	10.52%

As demonstrated most notably in Figure 1, while there is little difference in ED visits and inpatient admissions by rurality among children, the patterns of utilization by rurality are opposite in the 18-64 and 65+ age categories. In the 18-64 category, those living in more remote and rural areas see lower utilization, similar to the pattern of overall utilization from Table 1. In all non-metropolitan areas, however, those 65 and older have significantly higher rates of both ED visits and inpatient admissions, with the difference especially pronounced for ED visits with 483.52 visits per 1,000 member years in Metropolitan areas compared to 710.12 visits per 1,000 member years in Isolated Rural areas, and rates even higher in Large Rural and Small Rural areas. Some of these differences might be attributable to the fact that rural areas are older on average, so the 18-64 category in Isolated Rural areas may contain fewer people of childbearing age who are eligible because they are pregnant or perinatal and whose utilization patterns will differ from non-pregnant, non-elderly adults who are eligible due to disability or income alone.

Figure 1. ED Visits and Inpatient Stays by Rurality and Age



By Race/Ethnicity

Table 3 shows results stratified across race and ethnicity categories of Hispanic, non-Hispanic White, and non-Hispanic Black. As mentioned earlier, people in other race and ethnicity categories were not included. In addition, a large proportion of the enrollees had no race/ethnicity data and could not be included. As data quality improves, better research can be conducted on finer categorizations of race. Across all metrics, Hispanic Medicaid enrollees of any race had the lowest utilization rates while non-Hispanic Black enrollees had the highest utilization rates. For readmission rates, across all categories of race and ethnicity, rates were significantly higher in metropolitan areas, while readmission rates within rural categories were more similar to each other.

Table 3. Health Care Utilization by Race/Ethnicity

RUCA	Hispanic (any race)	Non-Hispanic White	Non-Hispanic Black
ED Visits per 1,000 Member Years			
Metropolitan	593.65	712.69	890.35
Large Rural	627.65	819.52	979.93
Small Rural	622.44	800.26	931.64
Isolated Rural	566.54	669.32	867.27
All Enrollees	596.25	732.17	896.07
Inpatient Stays per 1,000 Member Years			
Metropolitan	88.29	138.69	138.37
Large Rural	82.91	133.32	138.86
Small Rural	87.83	128.94	138.63
Isolated Rural	83.09	116.43	142.62
All Enrollees	87.88	136.11	138.44
Inpatient Length of Stay (Days)			
Metropolitan	5.3	5.9	6.0
Large Rural	4.8	5.4	5.7
Small Rural	5.0	5.3	5.9
Isolated Rural	4.9	5.2	6.1
All Enrollees	5.3	5.8	6.0
30-Day Readmission Rate (Percentage)			
Metropolitan	12.36%	13.95%	15.73%
Large Rural	9.16%	10.73%	11.73%
Small Rural	9.61%	10.31%	10.74%
Isolated Rural	9.03%	9.92%	11.38%
All Enrollees	12.07%	13.08%	15.36%

As Figure 2 demonstrates, patterns by rurality within each racial/ethnic category were more heterogenous. Among non-Hispanic White enrollees, inpatient admissions per 1,000 were lower in all categories of rural, while the rate of inpatient admissions was similar or higher in rural for non-Hispanic Black. Black enrollees in Isolated Rural areas had the highest rate of inpatient admissions at 142.62 per 1,000 member years. For ED visits, however, Black enrollees living in Large Rural areas experienced the highest rates of ED visits. Large Rural areas had the highest rates of ED visits across all racial/ethnic categories.

Figure 2. ED Visits and Inpatient Stays by Rurality and Race/Ethnicity

By Sex

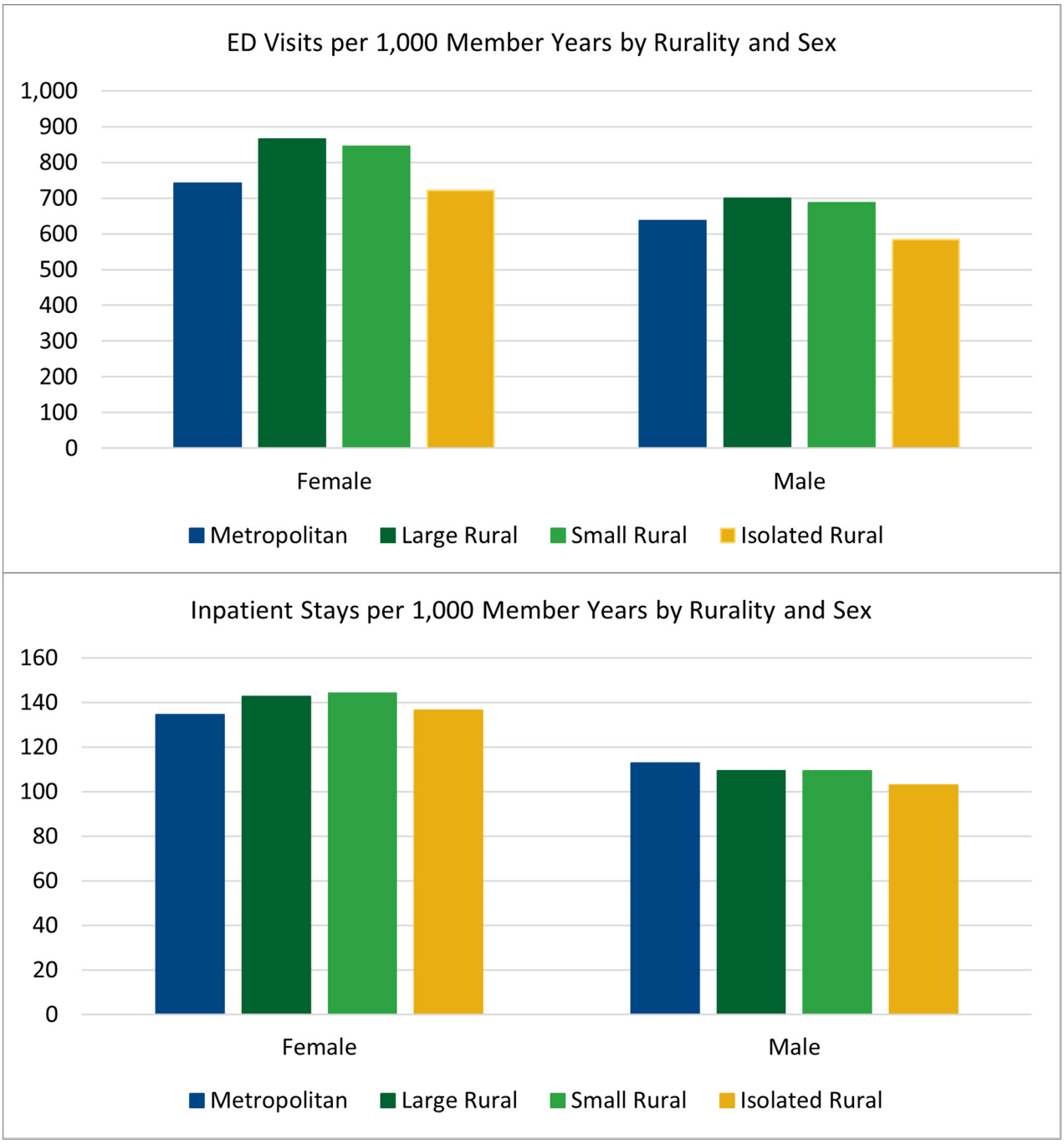
Variation in utilization by sex is likely driven to a significant extent by the eligibility of people who are pregnant or perinatal and whose health care needs are significantly different from non-pregnant or perinatal people who qualify for Medicaid. These differences may also reflect slightly different age distributions, with women having higher life expectancies and comprising a greater proportion of the oldest old (those who are over 85). Table 4 shows that ED visits are much higher in women than in men across all categories of rurality, with 864.88 visits per 1,000 member years among Large Rural women compared to 699.44 among men, 844.32 ED visits per 1,000 member years among women compared to 686.40 among men in Small Rural, and 721.28 ED visits per 1,000 member years among women in Isolated Rural areas compared to 584.45 among men. The difference between men and women in Metropolitan areas is smaller than in rural areas, at 105.08 visits per 1,000 member years, compared to the 136.83-165.44 visit difference we see in all rural categories.

Table 4. Health Care Utilization by Sex

RUCA	Female	Male
ED Visits per 1,000 Member Years		
Metropolitan	741.53	636.45
Large Rural	864.88	699.44
Small Rural	844.32	686.40
Isolated Rural	721.28	584.45
All Enrollees	757.67	643.25
Inpatient Stays per 1,000 Member Years		
Metropolitan	134.48	112.66
Large Rural	142.72	109.29
Small Rural	144.11	109.20
Isolated Rural	136.41	102.91
All Enrollees	135.78	111.90
Inpatient Length of Stay (Days)		
Metropolitan	5.4	6.3
Large Rural	5.0	5.9
Small Rural	5.1	5.9
Isolated Rural	4.9	5.8
All Enrollees	5.3	6.2
30-Day Readmission Rate (Percentage)		
Metropolitan	11.35%	16.92%
Large Rural	9.15%	12.75%
Small Rural	8.98%	11.91%
Isolated Rural	8.98%	11.53%
All Enrollees	10.95%	16.18%

Figure 3 shows that inpatient admissions are highest among men in metropolitan areas, while women have a higher number of admissions in all rural categories. Men do, however, have longer lengths of stay and a higher readmission rate, which may also reflect differences in the types of visits, as inpatient stays for births are likely to be shorter and less likely to result in readmissions than among those admitted for other reasons.

Figure 3. ED Visits and Inpatient Stays by Rurality and Sex



DISCUSSION

While overall utilization of acute inpatient and emergency department services is higher in Large Rural and Small Rural areas, stratifying results by certain demographic characteristics reveals a more nuanced picture of health care utilization in the rural Medicaid population when compared to utilization in metropolitan populations. Some of the observed differences in utilization may be due to limited accessibility of hospitals within some rural areas, as those who are far from emergency departments may be inclined to seek care elsewhere (such as a Rural Health Clinic or an urgent care clinic) if they need to travel to receive treatment. Increased travel and transportation burden is associated with lower rates of utilization across a myriad of health care services.[11,12] Longer travel distance is also associated with lower nonurgent ED use specifically among Medicaid patients.[13] Rural areas, which would be the most likely to have long travel times to acute care, have consistently low utilization, lending support to the effect of proximity on utilization.

Additional differences in utilization across the rural-urban continuum may be due to the heterogenous demographic distribution of Medicaid enrollees across rural America. Rural populations are not homogenous in age and race/ethnicity distribution across the entire country. The rural South (specifically the Southeast) is home to a greater proportion of the rural non-Hispanic Black populations, while the rural Southwest is home to larger Hispanic populations.[14] Rural areas in the West, which are often some of the most remote, are more likely to be predominantly non-Hispanic White. Prior studies have found that older Medicaid enrollees in the West and South had lower rates of ED use than those in the North and Midwest.[15] Other demographic factors, such as age, may also be unevenly distributed, as older rural populations are even more likely to be non-Hispanic White than their younger counterparts, further contributing to differences in utilization.[16] Further research that examines the interaction of these characteristics could delve into these possibilities with more clarity.

Additional research into the interactions between category of Medicaid eligibility and utilization among rural Medicaid enrollees would also illuminate potential causes of differences between the demographic categories described in this paper. As described in the introduction, Medicaid enrollees are different from other insured populations (such as Medicare beneficiaries or privately insured populations) because they are low income and because many meet additional categorical eligibility requirements (such as being a child, a pregnant or perinatal adult, an older adult, or a disabled adult) that contribute to substantial variance in their need for health care. This variance is reflected most clearly in the stratification of utilization by age and by sex, but there are many other potential factors that contribute to the results shown in this brief.

There are several limitations to this research. First, as already mentioned earlier in this discussion, we did not examine interactions between different demographic characteristics and utilization, which could further elucidate the primary factors that contribute to disparities in utilization seen between non-Hispanic White, non-Hispanic Black, and Hispanic populations of any race. Second, our population consisted only of those with full coverage as opposed to those with partial coverage, such as some dually eligible Medicare-Medicaid beneficiaries. Patterns among those who are enrolled in Medicaid but do not qualify for full Medicaid coverage may differ from those who are fully eligible. We also only used data from a single year, which did not allow us to examine any trends in utilization across time. As our data were from 2019, they also did not reflect any changes in health care utilization due to the COVID-19 pandemic, which began in 2020 and substantially affected both health care utilization and Medicaid enrollment. Lastly, as of July 2019, 69% of all Medicaid enrollees were covered by managed care.[17] While the quality of encounter data is best in the T-MSIS inpatient and other services files that are used for this brief, the quality and accuracy of T-MSIS data may differ between fee-for-service and managed care Medicaid enrollees.[18]

CONCLUSION

This study provides additional insight into health care utilization among a national Medicaid population. We found that overall rates of inpatient stays and ED visits were lower among rural Medicaid populations, with the most remote rural areas having the lowest utilization. When broken down by several demographic characteristics such as age, sex, and racial/ethnic identity, patterns of health care utilization became more varied across the rural-urban continuum. Future research into rural Medicaid health care utilization should consider the nuance afforded by incorporating interactions between rurality and other patient characteristics.

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