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Evaluating Emergency Department Utilization

For Researchers using the Centers for Medicare & Medicaid Services Chronic Condition Data Warehouse (CCW)

Date: May 9, 2012

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Abstract

Background: Previous studies have found that Medicaid enrollees have higher rates of emergency department (ED) utilization compared to Medicare, private insurance and uninsured populations. In an effort to provide a more comprehensive and nuanced understanding of ED utilization in Medicaid, we explore utilization patterns for different subpopulations of Medicaid.

Methods: Using 2008 claims data from the CMS Chronic Condition Data Warehouse (CCW), we compare ED utilization rates across states, eligibility and age categories, urban-rural areas, and payment models. We focus on the utilization of Medicaid members in 39 states in a fee-for-service (FFS) payment model. Additionally, we categorize ED visits as "required," "potentially avoidable," and "avoidable," using an adaptation of the New York University ED algorithm.

Results: The observed ED utilization for Supplemental Security Income (SSI) and Temporary Assistance for Needy Families (TANF) eligible adults was 894 and 780 visits per year per thousand members, respectively. Our analysis reveals higher utilization rates in SSI compared to TANF members across all age categories and lower utilization rates for children as compared to adults. Additionally, we observe somewhat higher utilization rates in FFS as compared to managed care and higher utilization in more rural counties as compared to urban counties. Lastly, we determine that high utilization does not necessarily translate to a higher percentage of avoidable visits and identify TANF children as having the highest percent of avoidable ED visits.

**Conclusions:** ED utilization varies significantly within the Medicaid population.

Keywords: Medicaid, Emergency Department (ED), Emergency Room, Service Utilization, Temporary Assistance for Needy Families (TANF), Supplemental Security Income (SSI).

Emergency Department Utilization Overview

The Emergency Department (ED) provides health care services to individuals that are in critical need of medical attention. The ED is typically open 24 hours a day and accepts all patients without appointments, so at times EDs are used to access primary care services. Previous studies have found that Medicaid enrollees have higher rates of ED utilization compared to Medicare, private insurance and uninsured populations. Using a statistical extrapolation of survey results, the Centers for Disease Control and Prevention (CDC) estimated that Medicaid enrollees have an ED utilization rate almost double the utilization rates of Medicare and uninsured populations and almost quadruple the rate of the private insurance population (Figure 1). [1] Furthering understanding and addressing this differential has the potential to improve quality of care, reduce unnecessary costs, and promote a more efficient use of health care resources.

Figure 1. ED Visits per 1000 Individuals per Year, by Insurance Type, 2006
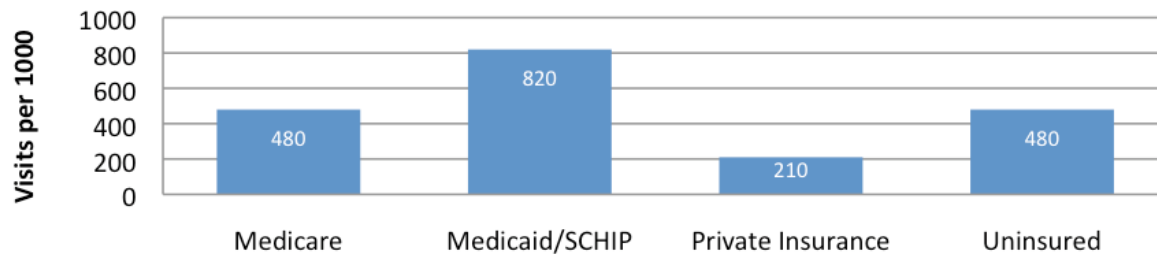
Source: CDC/NCHS, National Hospital Ambulatory Medical Care Survey, 2008

According to a study by the Robert Wood Johnson Foundation, there are multiple factors that influence ED utilization, among them, convenience, access to specialty care, perceptions of higher-quality care in hospital setting, and differing perceptions of urgency between patient and clinicians. [2] For the Medicaid population in particular, the literature generally attributes higher rates of utilization to limited access to primary care physicians stemming from Medicaid's lower reimbursement rates. [3] Others have also suggested that the health of Medicaid beneficiary groups, in particular the disabled, contributes significantly to the discrepancy of ED utilization between Medicaid enrollees and other groups. [4]

The Chronic Condition Data Warehouse (CCW) presents an opportunity to conduct a thorough analysis of ED utilization for Medicaid enrollees. Researchers can use the CCW data, which includes Medicaid eligibility data as well as FFS claims data and managed care encounter data. The state's Medicaid data is first processed through the Medicaid Medical Information System (MMIS) and after undergoing a series of edits, the remaining data is then submitted to CMS's Medical Statistical Information System (MSIS) and all states are combined for the Medicaid Analytic eXtract (MAX) data files. The CCW is populated with data from MAX with an

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[1] Pitts, S. Niska, R. et al. National Hospital Ambulatory Medical Care Survey: 2006 Emergency Department Summary. Centers for Disease Control and Prevention. 2008. Available at http://www.cdc.gov/nchs/data/nhsr/nhsr007.pdf

[2] DeLia D, Cantor J. Emergency department utilization and capacity. Robert Wood Johnson Foundation. Jul 2009. Available at http://www.rwjf.org/files/research/072109policysynthesis17.emergencyutilization.pdf

[3] Cunningham C, May J. Medicaid patients increasingly concentrated among physicians." Center for Studying Health System Change. 2006. Available at: http://www.hschange.com/CONTENT/866/866.pdf

[4] Cunningham P. "What Accounts for Differences in the Use of Hospital Emergency Departments Across U.S. Communities?" Health Affairs. Web Exclusive. Jul 2006.

abundance of information, the CCW data can be used to examine ED utilization from multiple perspectives and to explore the underlying causes contributing to these high Medicaid ED utilization rates. In this report, we present an analysis of how CCW data from 2008 can be used to measure, compare, and categorize ED utilization across the Medicaid programs of different states.[5] This paper examines ED utilization in Medicaid and explores utilization patterns for different subpopulations of Medicaid, including eligibility categories, ages, care delivery models, and individuals in urban or rural areas. As part of this analysis, we examine potentially avoidable ED visits. We encourage other researchers to use our approach as well as our findings to continue analyzing ED data and informing policy decisions.

Emergency Department Data Anomalies

When using the CCW data to conduct analyses of ED visits, it is important to run a data check to determine the validity of the algorithm that was used to identify ED visits. Two commonly used approaches would be to conduct macro and financial validations. From these validations, researchers can get a rough sense of which states have data issues that should exclude them from further analyses.

An example of a macro validation approach is to measure the ED utilization of every state. As seen in Figure 2, four states (California, Idaho, Vermont, and New York) had a utilization of zero, suggesting that there were no ED visits in these states. Further analysis showed that very few or no ED visits at all were identified with the UB-92 revenue codes commonly used to bill for ED services in these states. This finding is attributable to the fact that these states use another reimbursement method for ED visits that is state-specific. Therefore, these four states were excluded from all subsequent analyses. In total, only 39 states were used in our analysis of ED utilization. Seven states did not have any CCW data[5] and the four states mentioned were excluded because they lacked identifiable ED data.

Figure 2. ED Visits per 1000 Individuals per Year, by State, 2008
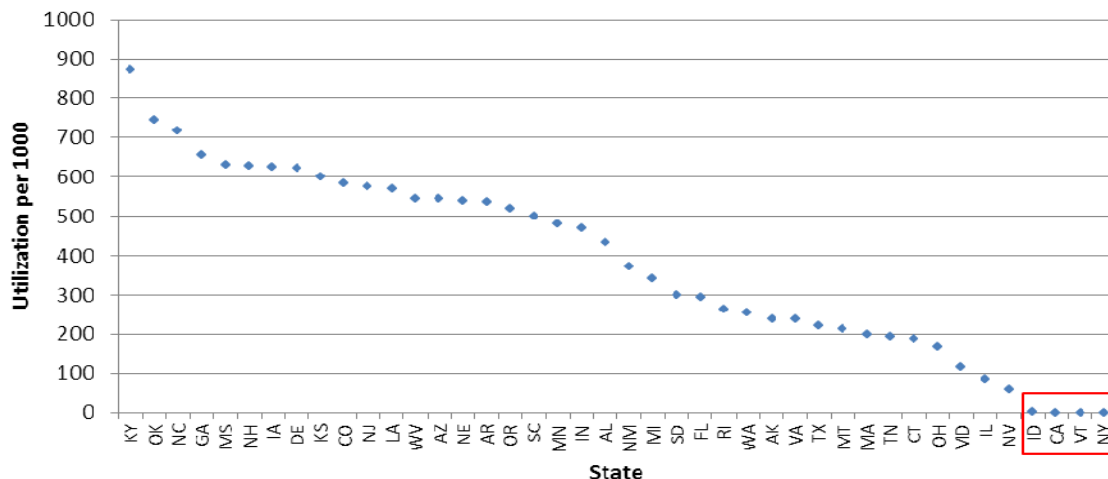

States with low ED utilization rates (e.g., Illinois and Nevada) might also have poor data, but it would be difficult to correctly determine this without further analysis. The key is to control for

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[5] The CCW 2008 data that we used for this analysis did not include data for the following states: Hawaii, Maine, Missouri, North Dakota, Pennsylvania, Utah, and Wisconsin.

managed care programs (since the encounter data might be incomplete), eligibility category, and age category when conducting the analysis (see Appendix A for more information regarding our classification). Our own analysis suggests that validity of ED data might differ from one program or category to another. For example, while Texas, Arizona, and Rhode Island had higher utilization rates for their entire Medicaid program (Figure 2), after controlling for payment method (FFS), eligibility group (Temporary Assistance for Need Families, TANF), and age category (Adults), the utilization rates changed significantly (Figure 3).

Figure 3. ED Visits per 1000 per Year, for FFS TANF Adults, by State, 2008
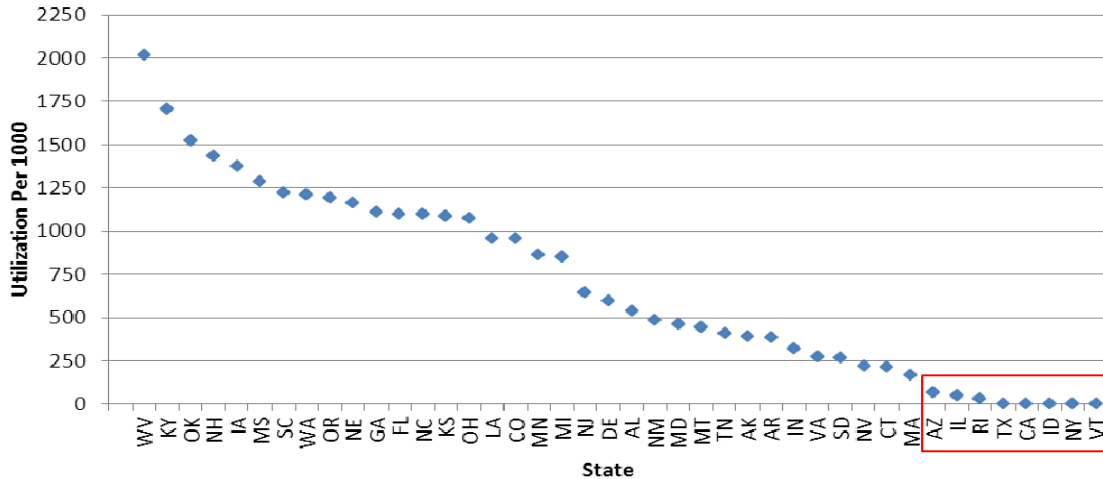
The source of some of the observed differences can also be attributed to reimbursement methods and encounter data completeness. Unless otherwise specified, we used all the states where a data issue was not suspected in identifying ED visits using the UB-92 revenue codes.

Methodology

Measuring Emergency Department Utilization

The first step in our analysis was to identify the claims that should be counted as ED visits. Using the CCW Inpatient Records and the CCW Other Services Records, we identified ED visits by using the following UB-92 Revenue Codes:

UB-92 Code	Description
450	ED – General
451	ED- EMTALA Emergency Medical Screening Services
452	ED - ED Beyond EMTALA Screening
459	ED - Other Emergency Department
981	Professional Fees - Emergency Department

If a person was seen in the ED and subsequently admitted, it was not considered an ED visit. As per our other analyses of the CCW data, we categorized Medicaid enrollees by program (e.g., FFS, MCO, etc.), eligibility category (e.g., TANF, SSI, etc.), and age category (e.g., Adults, Children, etc.) to control for varying characteristics of Medicaid enrollees that might invalidate

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a comparative analysis. For each combination of program, eligibility category, and age category we looked at a few key metrics:

Metric	Description
ED Visits	The number of ED visits for Medicaid enrollees
ED Costs	The costs associated with every visit
Percent of Users	Percent of enrollees that had at least one ED visit
PMPM	Cost of ED visit per enrollee/member per month
Claims per User	Number of ED visits per user
Utilization per Year per Thousand	Utilization per year per a thousand enrollee

Since many Medicaid beneficiaries are not enrolled in Medicaid the full year, it is important to use the number of months each beneficiary was enrolled in Medicaid. This value can then be used to calculate PMPM and utilization per thousand enrollees per year.

Categorizing Emergency Department Visits

To further understand Medicaid ED utilization rates, we used the algorithm developed by NYU Center for Health and Public Service Research in collaboration with a panel of experts that assigns the probability that an ED visit was non-emergent, primary care treatable, emergent but preventable, and emergent but not preventable. [6] Using this algorithm, each claim is given the probability that it falls into one of these classifications according to the primary diagnosis code. The sum of the probabilities of these four classifications is always 100 percent. It is important to note that the classification of each claim is based only on the primary diagnosis code and does not take into account other factors such as age or comorbidities. The following table describes each emergent classification:

Table 1. NYU Emergent Classification

Classification	Description
1. Non-emergent	Immediate medical care was not required within 12 hours.
2. Emergent/Primary Care Treatable	Treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting.
3. Emergent - ED Care Needed - Preventable/Avoidable	Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness.
4. Emergent - ED Care Needed - Not Preventable/Avoidable	Emergency department care was required and ambulatory care treatment could not have prevented the condition.

In addition to the emergent classifications, the NYU algorithm separately classifies claims that were related to mental health, injury, and alcohol/substance abuse, also by using the primary diagnosis code. Claims in these classifications were not given a probability of being emergent.

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[6] NYU Center for Health and Public Service Research. NYU ED Algorithm Background. Available at http://wagner.nyu.edu/chpsr/ed_background.shtml

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The authors specifically state that the tool is "is not intended as a triage tool or a mechanism to determine whether ED use in a specific case is 'appropriate,'" but for our purposes this algorithm provides a proxy to estimate the types of ED visits. Since each claim was given a probability for each of the four classifications discussed in Table 1, we further grouped NYU's four classifications into three categories, termed "Lewin Emergent Categories" to simplify the interpretation (See Table 2).
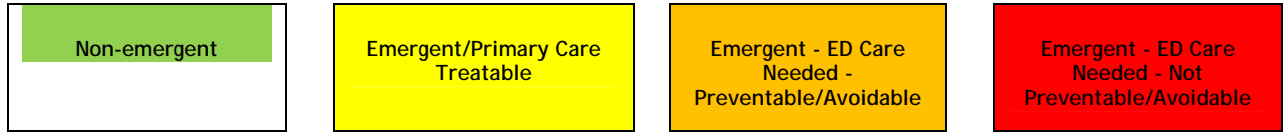
Table 2. Lewin's Emergent Categories

Category	Logic
ED Required	Sum of the probability that each claims was (Emergent - ED Care Needed - Preventable/Avoidable) and (Emergent - ED Care Needed - Not Preventable/Avoidable) was greater than or equal to 50%.
ED Avoidable	Sum of the probability of (Non-emergent) and (Emergent/Primary Care Treatable) is greater than or equal to 80%.
ED Potentially Avoidable	Sum of the probability of (Non-emergent) and (Emergent/Primary Care) Treatable is greater than 50% but less than 80%.

Our logic in assigning claims to the Lewin Emergent Categories was more conservative in assigning a claim the category of avoidable (where the sum of probability had to be greater than 80%) than we were in assigning a claim the category of required (where the sum of probability had to be greater than 50%).

In addition to these three categories, we used the other NYU classifications–mental health, injury, alcohol/substance abuse, and not classified–without any modifications to the NYU algorithm. These classifications were considered separately from the Lewin Emergent Categories. Here are a few examples of how ED claims, if not already assigned to mental health, injury, alcohol/substance abuse, and not classified by the NYU algorithm, were assigned a Lewin Emergent Category:

NYU Emergent Classifications

Non-emergent	Emergent/Primary Care Treatable	Emergent - ED Care Needed - Preventable/Avoidable	Emergent - ED Care Needed - Not Preventable/Avoidable

**Lewin Required
Claim 1:**

20%	20%	30%	30%

Since the sum of these classifications was greater than or equal 50% this claim was categorized by Lewin as being Required.

**Lewin Avoidable
Claim 2:**

30%	50%	15%	5%
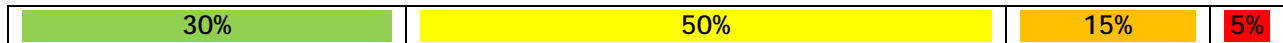
Since the sum of these classifications was greater than or equal to 80% this claim was categorized by Lewin as being Avoidable.

**Lewin Potentially Avoidable
Claim 3:**

30%	40%	15%	15%
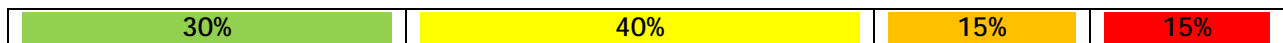
Since the sum of these classifications was greater than 50% but less than 80% this claim was categorized by Lewin as being Potentially Avoidable.

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Emergency Department Utilization Results

Visit Distribution for Enrollees and Users

One component of our analysis was to examine the distribution of ED visits per enrollee and per user. An enrollee is defined as an individual that was enrolled in Medicaid, while a user is defined as an enrollee who has had at least one ED visit in 2008. This analysis was intended to get a rough sense of both the data and utilization patterns for enrollees and users, as well as potentially identify users with high utilization that might be driving the high overall utilization

Figure 4. ED Visits per Enrollee, 2008   Figure 5. ED Visits per User, 2008

Total Enrollees: 35,630,239   Total Users: 6,215,171

■1 ■2-3 ■4-5 ■6-10 ■11+ ■No visits
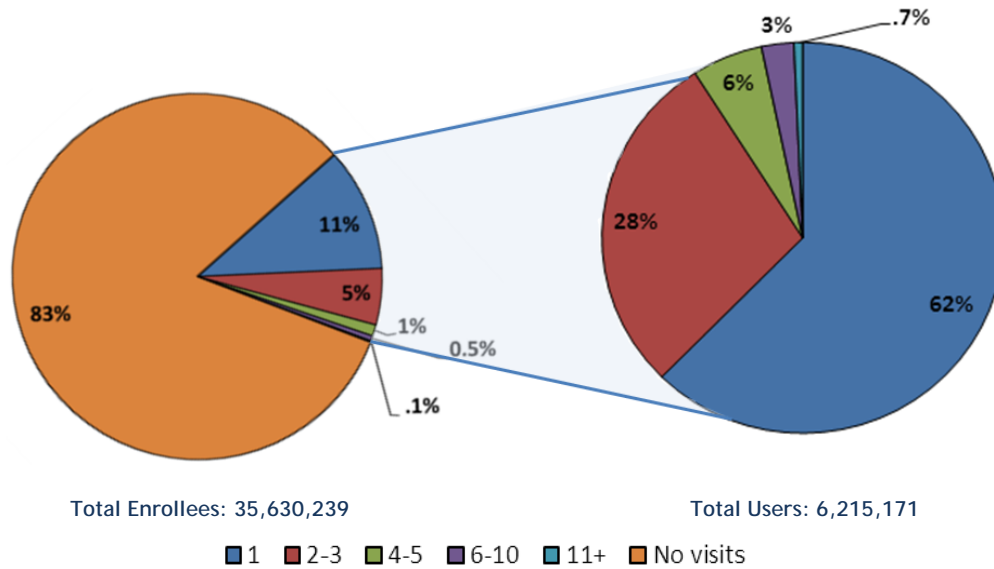
of the Medicaid program. As Figure 4 shows, a large majority (83 percent) of all Medicaid enrollees in the CCW data had no ED visits in a year. Approximately 17 percent of all Medicaid enrollees had one or more ED visits. As Figure 5 shows, most users only had one visit (62 percent), about one quarter had two to three visits, and approximately 10 percent had four or more visits.

Figure 6. ED Visits per User, by State, 2008
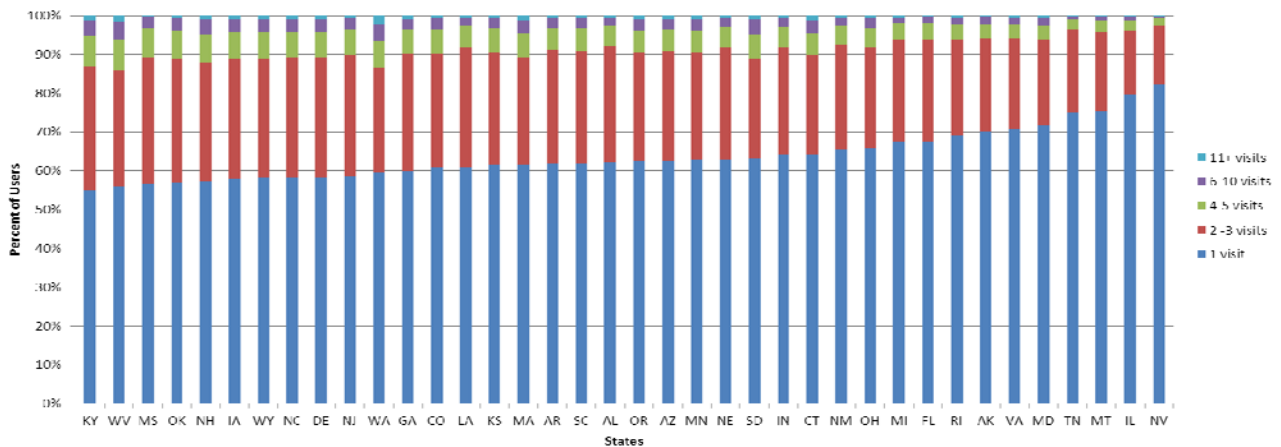
Across states, the percentage of users that had only one visit varied from around 55 to 80 percent (Figure 6). States that had a higher percent of users with one visit also had lower

percent of users with two to three visits. In fact, states with a higher percent of users with one visit also tended to have less "frequent flyers" (Figure 7)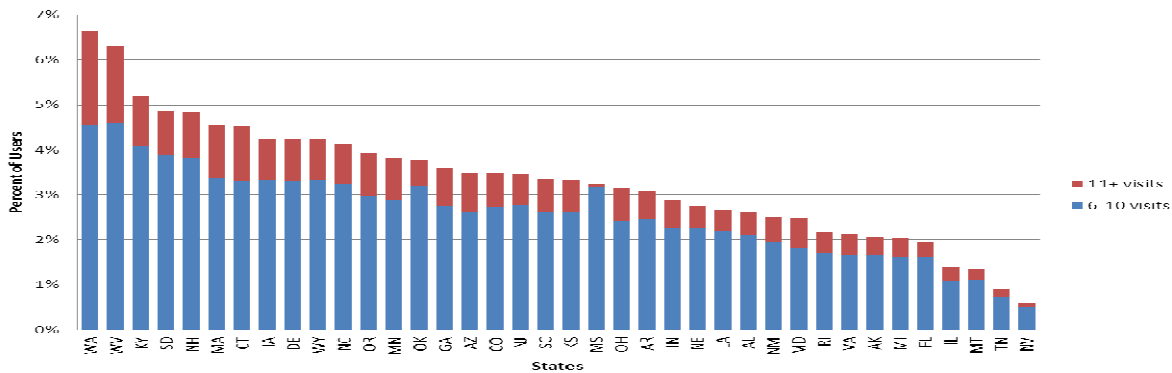. The "frequent flyers," defined as having six or more visits, represent from less than one percent to seven percent of ED users across states. These are the Medicaid beneficiaries that are in the most need of care coordination and perhaps represent the best opportunity for savings.

Figure 7. Percent of Users with 6 Visits or More, by State, 2008

Eligibility and Age Categories

One of our primary goals was to compare utilization rates among different subpopulations of Medicaid enrollees. Medicaid enrollees can vary significantly in terms of risk profiles and utilization patterns, which can be lost if looking at the Medicaid population as a whole. Our analysis focused on two of the main Medicaid eligibility categories, Temporary Assistance for Needy Families (TANF) [7] and Supplemental Security Income (SSI), [8] and two age categories, adults and children, [9] that were not enrolled in a managed care program and accessed services through a fee-for-service (FFS) system (see Appendix A for logic used to determine managed care, eligibility, and age categories).

For each subpopulation we calculated the total number of ED visits, total months of enrollment, [10] national utilization rate per year per 1000 members, [11] and the average and median utilization rate for the 39 states (Figure 8). [12] We calculated the average and median utilization rate to account for the variability across the states that might be otherwise lost in the national utilization rate of each subpopulation. Since the comparative analysis of ED utilization across states is our primary goal, in discussing the results we will use the average utilization, but encourage that the absolute and median utilization rates to be used as measures of the reliability of using the average. For example, while the average utilization for SSI adults was 894

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[7]   Temporary Assistance for Needy Families (TANF) is a cash-assistance program to low-income families. While there is no formal link between TANF and Medicaid/CHIP, TANF beneficiaries are likely to qualify for Medicaid.

[8]   Supplemental Security Income (SSI) is a cash-assistance program to low-income individuals that are over the age of 65, blind, or disabled. Although there is no formal link, SSI beneficiaries are also likely to qualify for Medicaid.

[9]   Adults are defined as individuals between the ages of 21 to 64. Children are defined as individuals between the ages of 1 to 20.

[10]   Not all Medicaid beneficiaries are enrolled for the full year. For this reason, the months of enrollment must be used when looking at utilization.

[11]   The national utilization rate is calculated as the total ED visits divided by the total months of enrollment, multiplied by 12 (i.e., twelve months) and multiplied by 1000 (i.e., a thousand members).

[12]   The average utilization rate calculates the utilization rates for each state individually and then takes the average utilization rate of the 39 states. The median utilization rate is the middle utilization rate of the 39 states, arranged from lowest to highest utilization.

per year per 1000 members, both the absolute and the median utilization rate are slightly higher. Since both the absolute and median utilization rates are slightly higher, it is quite possible that the "true" utilization rate is higher than the average utilization rate.

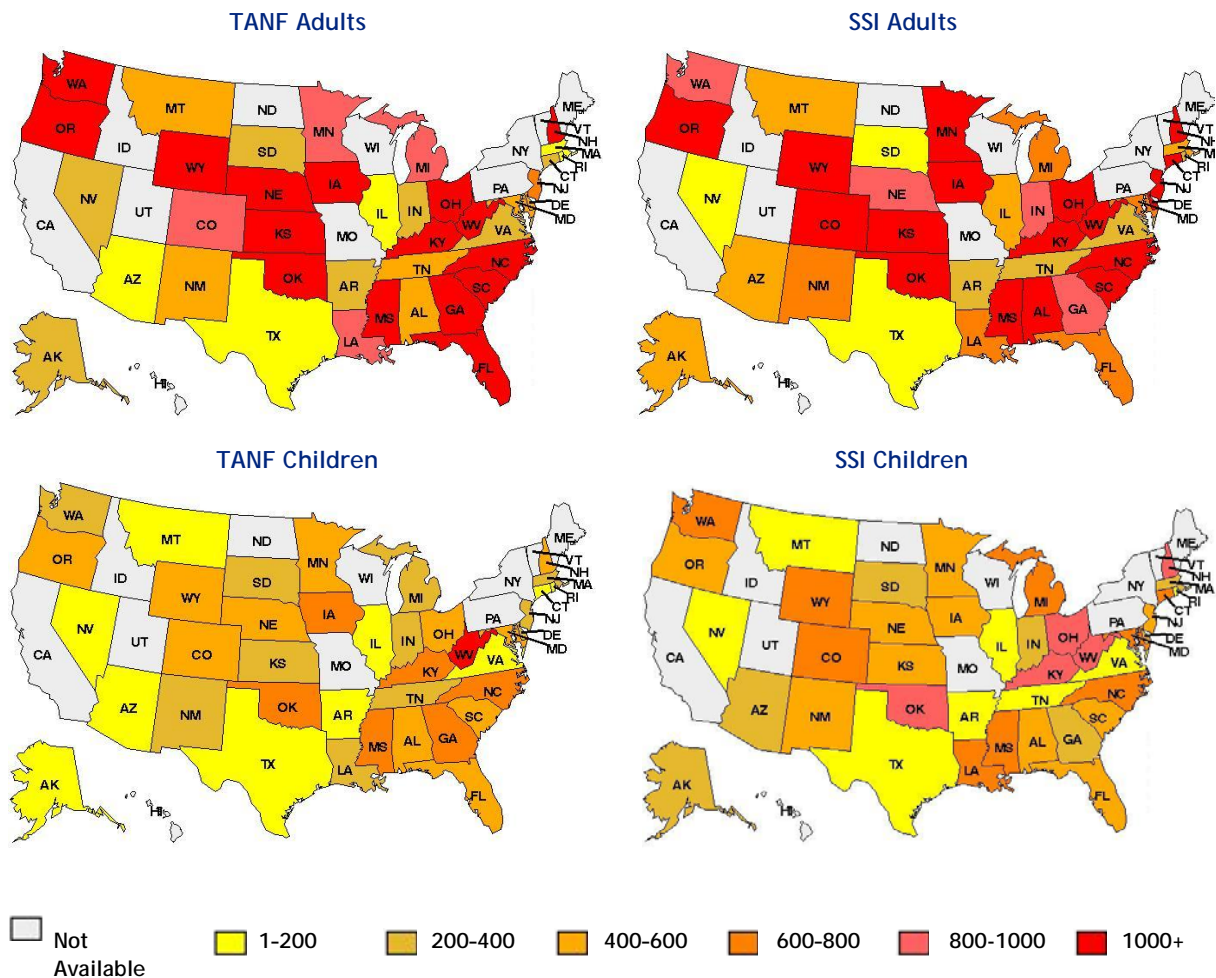Figure 8. ED Utilization in FFS, by Eligibility and Age Category, 2008

Eligibility Category	Age Category	Total ED Visits	Total Months of Enrollment	National Utilization Rate (per year per thousand enrollees)	Average Utilization Rate for States (per year per thousand enrollees)	Median Utilization Rate for States (per year per thousand enrollees)
SSI	Adult	565,100	6,894,327	984	894	951
	Child	223,556	5,851,052	458	472	471
	Newborn	2,067	45,902	540	483	403
TANF	Adult	431,717	7,425,075	698	782	852
	Child	862,770	23,255,012	445	404	355
	Newborn	99,713	1,533,843	780	654	706

As expected, SSI members in general had higher ED utilization rates than TANF members of the same age category. SSI members are more likely to have poorer health and tend to have more complex care needs given the eligibility requirements for SSI. Of all SSI members, adults had the highest average ED utilization rate. Adults also had the highest average ED utilization rate within the TANF eligibility category, with an ED utilization of 782. This makes sense since adults are more likely to have health issues and might also have a higher likelihood of being injured. Interestingly, for both eligibility categories newborns had higher ED utilization rates than children. [13]

Figure 9 shows that the difference in utilization varied significantly between subpopulations across states. The State of Colorado, for example, had a significantly different rate of ED utilization for each different subpopulation. For TANF children, Colorado had a utilization rate of 578; for SSI children, a utilization rate of 634; for TANF adults, a utilization rate of 955; and finally for SSI adults had a utilization rate of 1,372. This gradual increase in utilization rate according to the age category (from children to adults) and eligibility category (TANF compared to SSI) was also apparent in other states, although not all of them.

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[13] Newborns are defined as individuals less than one year old.

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Figure 9. ED Utilization (per year per 1000 enrollees) in FFS, by Eligibility and Age Category, 2008

TANF Adults

SSI Adults

TANF Children

SSI Children

Legend: Not Available | 1-200 | 200-400 | 400-600 | 600-800 | 800-1000 | 1000+

The State of Georgia, for example, diverged from this pattern. For TANF children in this state, the utilization rate was 632; for SSI children, the utilization rate was 297; for TANF adults, the utilization rate was 1,110; for SSI adults, the utilization rate was 951. Thus, Georgia had a similar pattern to Colorado and other states where the utilization rate was higher for adults compared to children. However, in this state the pattern regarding eligibility categories reversed – TANF adults and children had higher utilizations than members of the same age category in SSI. Maps, such as those in Figure 9, allow for the visualization of patterns and facilitate the task of pinpointing states with peculiar patterns.

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Comparing Fee-For-Service and Managed Care

States have the option of using a variety of payment models (e.g., FFS, managed care, primary care case management etc.). Some evidence suggests that Medicaid members enrolled in managed care programs have lower ED utilization rates. [14-15] The second part of our ED analysis focused on evaluating if ED utilization rates would also differ among payment models (see Appendix A for classification logic). Since not all states have managed care programs and those that do might not have complete encounter data, we were limited in the number of states that could be used for this analysis. According to our previous analysis on encounter completeness, only 15 states had reliable encounter data for 2008 (Figure 10). Of those 15, however, only 11 had reliable ED data (New York had no data and Arizona, Texas, and Rhode Island had suspiciously low ED utilization). For the 11 remaining states, we compared the utilization of Medicaid members that accessed care through FFS and those enrolled in a managed care organization (MCO) if there were more than two thousand Medicaid enrollees in both FFS and MCO, when controlling for eligibility and age categories.

Figure 10. Encounter Completeness, by State, 2008

|			
Not Available	Use	Use with Caution	Do Not Use

Figure 11 shows the difference in utilization between a FFS and a MCO program for each Medicaid subpopulation. The bars with positive difference suggest that ED use was higher for FFS than managed care for that subpopulation; bars with a negative difference are for the programs that had a higher utilization for managed care. For these 11 states, most of the Medicaid subpopulations had a higher utilization in a FFS program than in a managed care program. Nevertheless, it would be difficult reach any definitive conclusions based on these results alone. First, the sample is rather small and we would have to incorporate more states with reliable encounter data to validate this pattern. Secondly, the risk profile of these subpopulations might differ based on whether they were enrolled in FFS or MCO. Some states might offer the beneficiary the chance to voluntarily choose which managed care program they want to enroll in. Other states, however, require their members to enroll in a managed care program. If risk profiles are different based on which managed care program they are enrolled in, this might account for different ED utilization rates. Researchers would have to account for these policy differences in their analysis.

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[14] Bowen, G. Davidoff, A. Yemane, A. Effects of Medicaid Managed Care Programs on Health Services and Access Use. Health Serv Res. 2003 April; 28(2): 575-594.

[15] Dombkowski, KJ. Stanley, R. Clark, SJ. Influence of Medicaid managed care enrollment on emergency department utilization by children. Arch Pediatr Adolesc Med. 2004 Jan; 158(1):17-21.

Figure 11. Difference of ED Utilization* Between FFS and MCO Programs, by State, 2008
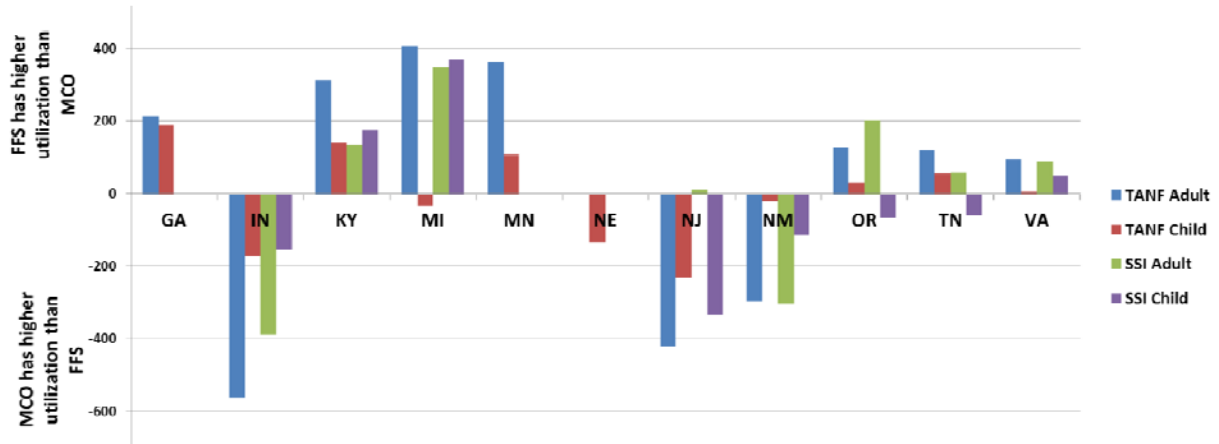
*Difference is the utilization of that subpopulation in FFS minus the utilization of that subpopulation in MCOs

Comparing ED Utilization in Urban and Rural Counties

Another aspect to consider when examining ED utilization of Medicaid enrollees is the geographical location of the enrollee. Evidence suggests that individuals in rural areas have higher rates of ED utilization compared to individuals in non-rural areas. [16] Our analysis examined whether this pattern was also visible in the Medicaid population. Using the National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme, every county of enrollee residence was assigned a level of population density between 1 and 6 (see Figure 12). [17]

Figure 12. National Center for Health Statistics Urban-Rural Classification Scheme

Population Density Level	Name	Description
1	Large metro, central	Counties in a Metropolitan Statistical Area (MSA) of 1 million or more population that: 1) contain the entire population of the largest principal city of the MSA, or 2) are completely contained within the largest principal city of the MSA, or contain at least 250,000 residents of any principal city in the MSA
2	Large metro, fringe	Counties in MSA of 1 million or more population that do not qualify as large central
3	Medium metro	Counties in MSA of 250,000 - 999,999 population
4	Small metro	Counties in MSA of 50,000 - 249,999 population
5	Micropolitan	Counties in micropolitan statistical area
6	Noncore	Counties not in micropolitan statistical area (i.e., most rural counties)

Source: CDC/NCHS, 2006

After assigning a population density level to each county, we examined the ED utilization rates by state while controlling again for care system (FFS), eligibility category (SSI and TANF), and

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[16]   Hines, A. Fraze, T. Stocks, C. Emergency Department Visits in Rural and Non-Rural Community Hospitals, 2008. Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality, Rockville, MD. 2011. Available at http://www.hcup-us.ahrq.gov/reports/statbriefs/sb116.pdf

[17]   Centers for Disease Control and Prevention. NCHS Urban-Rural Classification Scheme for Counties. 2006. Available at http://www.cdc.gov/nchs/data_access/urban_rural.htm

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age category (adults and children) (Figure 13). For the SSI population, there was a clear trend that more rural counties had higher ED utilization rates. SSI adults had a national utilization rate that ranged from 684 ED visits per year per thousand enrollees in a central large metro county to a utilization rate of 938 in a noncore rural county; SSI children had a national utilization rate that ranged from 192 ED visits per year per thousand enrollees in a central large metro county to a utilization rate of 520 in a noncore rural county. This trend was less clear for TANF adults and children, but was still apparent. For example, for TANF adults, the highest national utilization rates were for enrollees in small metros and micropolitans. The TANF children subpopulation diverged somewhat from this pattern, but it is important to note that there was little variability in utilization rates for all the non-central large metro areas; enrollees in a central large metro still had the lowest utilization rates.

Figure 13. ED Utilization Rates, FFS, by Eligibility, Age, and Population Density Level, 2008

Eligibility Category	Age Category	Population Density Level					
		1	2	3	4	5	6
SSI	Adult	684	742	838	894	855	938
	Child	192	323	355	437	453	520
TANF	Adult	279	591	567	629	625	513
	Child	254	351	316	336	339	314

*For each eligibility/age category, green indicates the population density level with the lowest utilization rate and red indicates the population density level with the highest utilization rate. Other colors fall somewhere in between the green-red gradient based on the utilization rate of the population density level.

Comparing utilization rates across counties with different levels of population density again demonstrates the importance of access and its influence on ED utilization rates. Rural areas tend to have fewer specialists than urban areas. Our analysis showed that there tend to be higher rates of ED visits in rural areas among SSI enrollees of all ages, but that trend was less apparent among TANF adults and children.

Emergency Department Visit Categories

Although high ED utilization rates might suggest problems with the delivery of health care, it is important to determine the proportion of these visits that were "avoidable" or "potentially avoidable" at the time. As described in our methodology section, our analysis categorized ED visits into seven categories: Required, Potentially Avoidable, Avoidable, Mental Health, Injury, Alcohol & Substance, and Not Classified. The categorization of all ED visits is based on a claim's primary diagnosis code, which was assigned to an overarching diagnosis group. Appendix B shows which category each diagnoses group was assigned to in addition to the percent of each category that the diagnosis group makes up. It is important to reiterate that these categories are based on probabilities and that some diagnosis groups were classified as both required and avoidable. For a diagnosis group to be assigned to required or potentially avoidable, it needed to have a probability higher than 50 percent that it actually fell in that category (see Methodology section). For the avoidable category, the diagnosis group needed to have a probability of higher 80 percent before being assigned to this category.

Figure 14 breaks down ED visits by category for TANF and SSI adults across states. Notice that required ED visits make up only a small portion of all ED visits. Grouped together, all the categories that are non-avoidable (i.e., mental health, alcohol/substance abuse, injury-related, not classified, potentially avoidable, and required) would make up approximately 50 percent of ED visits. To put things into perspective, FFS TANF and SSI adults had a combined utilization rate of 833 per thousand members per year. If we consider only the ED visits of all the non-avoidable categories for this population, the utilization rate would be 533 per thousand per year.

Figure 14. ED Categories as Percent of Total ED Visits, FFS, By Eligibility 2008
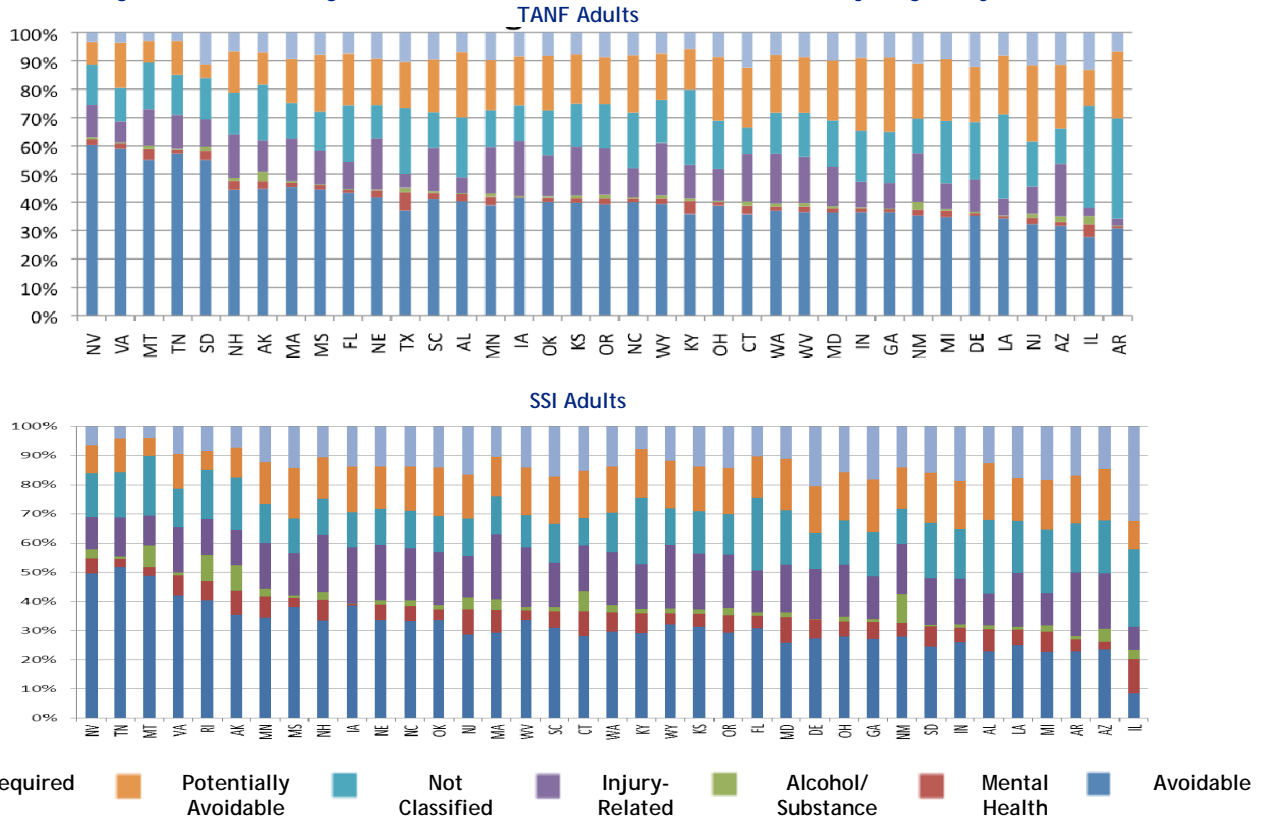
Avoidable ED Visits

Avoidable ED visits are of particular interest because they indicate possible excess cost in the system and can also help policy makers decide how to design appropriate changes in policies and/or delivery methods. As Appendix B shows, approximately 60 percent of all avoidable ED visits can be attributed to 10 diagnoses groups. Acute bronchitis was the most common avoidable diagnosis group and made up approximately 15 percent of all the avoidable ED visits. This is a condition that would not require an ED visit and could best be treated in an urgent care or primary care setting. This is also true for almost all of the diagnosis groups in the avoidable category.

Similar to the utilization analysis, we looked at the percent of avoidable ED visits by state for SSI and TANF, adults and children (Figure 15). A few results stood out from the comparison of these different populations. First, while the utilization was higher for SSI members, the percentage of avoidable ED visits was actually higher for TANF members. For example, SSI

adults had an average percent of avoidable ED visits of 20 percent and TANF adults had an average percent of avoidable ED visits of 42 percent. Similarly, SSI children had an average percent of avoidable ED visits of 36 percent and TANF children had an average percent of avoidable ED visits of 45 percent. This can probably be attributed to the higher risk profiles of SSI members. Since SSI members are a sicker population on average, their ED visits may be for more complex medical problems that actually require attention in the ED.
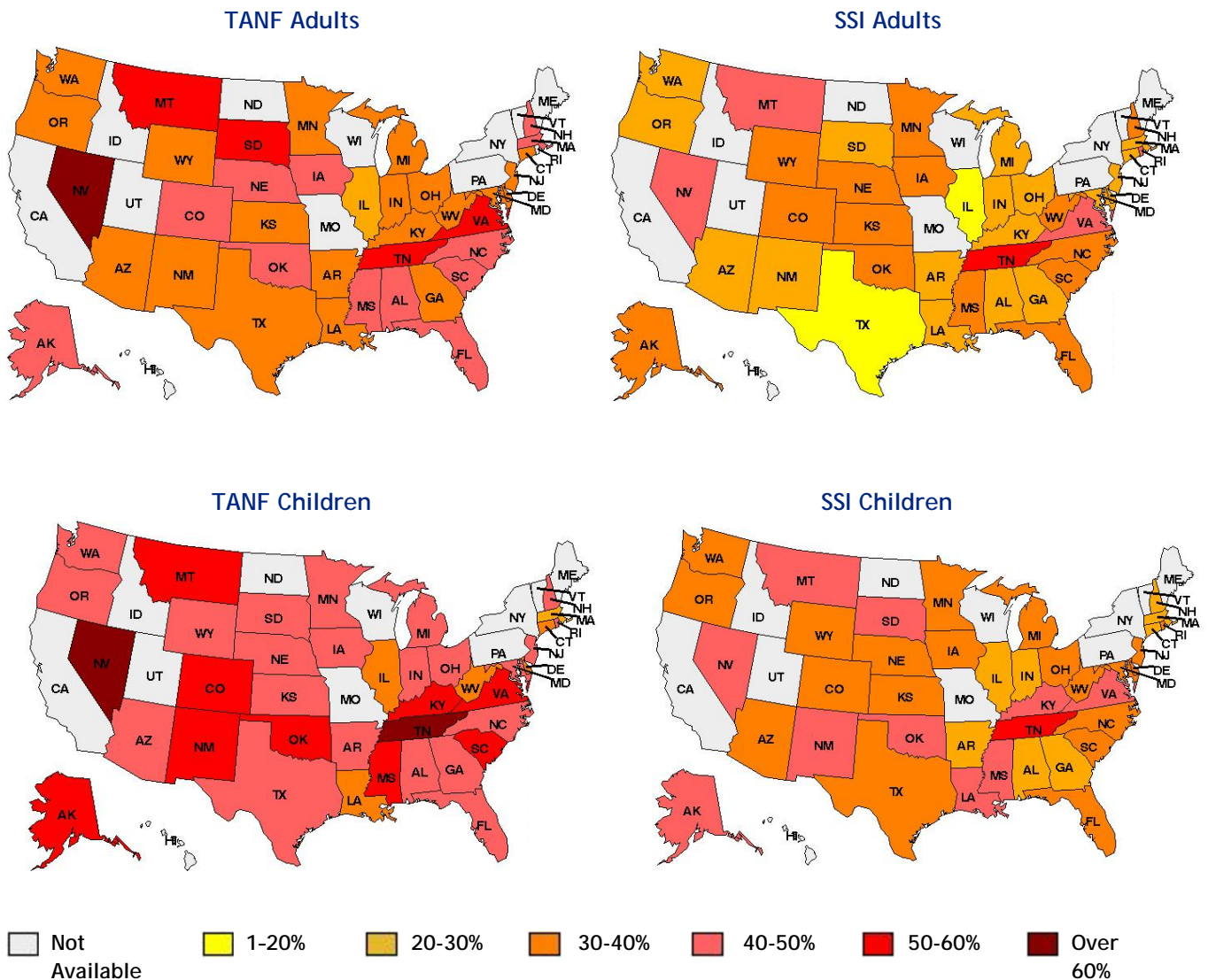
Figure 15. ED Avoidable Visits in FFS, by Eligibility and Age Category, 2008

Eligibility	Age	Total ED Visits	Total ED Avoidable Visits	National Percent Avoidable	Average Percent Avoidable for States	Median Percent Avoidable for States
SSI	Adult	607,889	193,306	31.8%	29.7%	29.3%
	Child	222,001	85,374	38.5%	35.8%	35.2%
	Newborn	2,014	866	43.0%	39.7%	37.5%
TANF	Adult	402,115	166,930	41.5%	42.2%	39.3%
	Child	785,440	403,546	51.4%	45.0%	45.0%
	Newborn	89,231	53,607	60.1%	52.6%	53.9%

There was also a noticeable difference in avoidable ED visits between children and adults regardless of the eligibility category – children had a higher percent of ED avoidable visits compared to adults in both SSI and TANF. SSI children had an average percent avoidable that was six percent higher than SSI adults and TANF children had an average percent avoidable that was 11 percent higher than TANF adults. Here there was also a trend reversal; while utilization was lower for children in both SSI and TANF, the percent of avoidable ED visits was higher for children. Interestingly, the highest percentage of avoidable ED visits both SSI and TANF was for the age category of newborns. These particular results show one of the shortcomings of using only the primary diagnosis code alone to assign ED category. For example, a newborn with acute bronchitis could potentially require an ED because of a not-fully developed immune system, a scenario that is much less likely for adults. Unfortunately, the algorithm does not take into account factors such as age or comorbidity and therefore, these results should be viewed with caution.

Similar to the utilization results, it is important to visualize the percent of avoidable ED visits by state (Figure 16). The relationship between utilization and percent avoidable can be seen at the state level. For example, states like Montana and Nevada that had low ED utilization rates (Figure 9) had a high percent of avoidable visits (Figure 16). For a state like West Virginia, the opposite was true. West Virginia had a utilization rate of over 1000 for three of the four subpopulations, but then had a percent of avoidable ED visits in the 30 to 40 percent range. The case of West Virginia shows that higher utilization rates do not necessarily translate to a higher percent of avoidable visits. While this trend was observed, this would also have to be further investigated for each state.

Figure 16. Percent of ED Avoidable in FFS, by Eligibility and Age Category, 2008

TANF Adults

SSI Adults

TANF Children

SSI Children

| | Not Available | | 1-20% | | 20-30% | | 30-40% | | 40-50% | | 50-60% | | Over 60% |

Mental Health Visits

Another category of interest for researchers is the percent of ED visits that are mental health related. Mental health visits were grouped into their own category and were not classified as required or avoidable. Regardless, the percent of ED mental health visits provides a glimpse to the overall quality of the health care system and its ability to care for patients before a mental health issue results in an ED visit.

Figure 17. ED Mental Health (MH) Visits in FFS, by Eligibility and Age Category, 2008

Eligibility Category	Age Category	ED Visits	MH Visits	National Percent of MH	Average Percent of MH	Median Percent of MH
SSI	Adult	607,889	32,069	5.3%	7.6%	5.6%
	Child	222,001	10,028	4.5%	6.7%	4.9%
	Newborn	2,014	1	0.0%	0.0%	0.0%
TANF	Adult	402,115	6,496	1.6%	2.1%	1.9%
	Child	785,440	7,131	0.9%	1.9%	1.2%
	Newborn	89,231	31	0.0%	0.1%	0.0%

As expected, the SSI population had a higher percentage of mental health visits compared to TANF members (Figure 17). SSI adults had an average percent of mental health visits that was six percent higher than TANF adults and SSI children had an average percent of mental health visits that was five percent higher than TANF children. Also, adults had a higher percentage of mental health visits compared to children, although not by very much. SSI adults had an average percent of mental health visits one percent higher than SSI children and TANF adults

Figure 18. Percent of ED Mental Health Visits in FFS, SSI, by Age Category, 2008
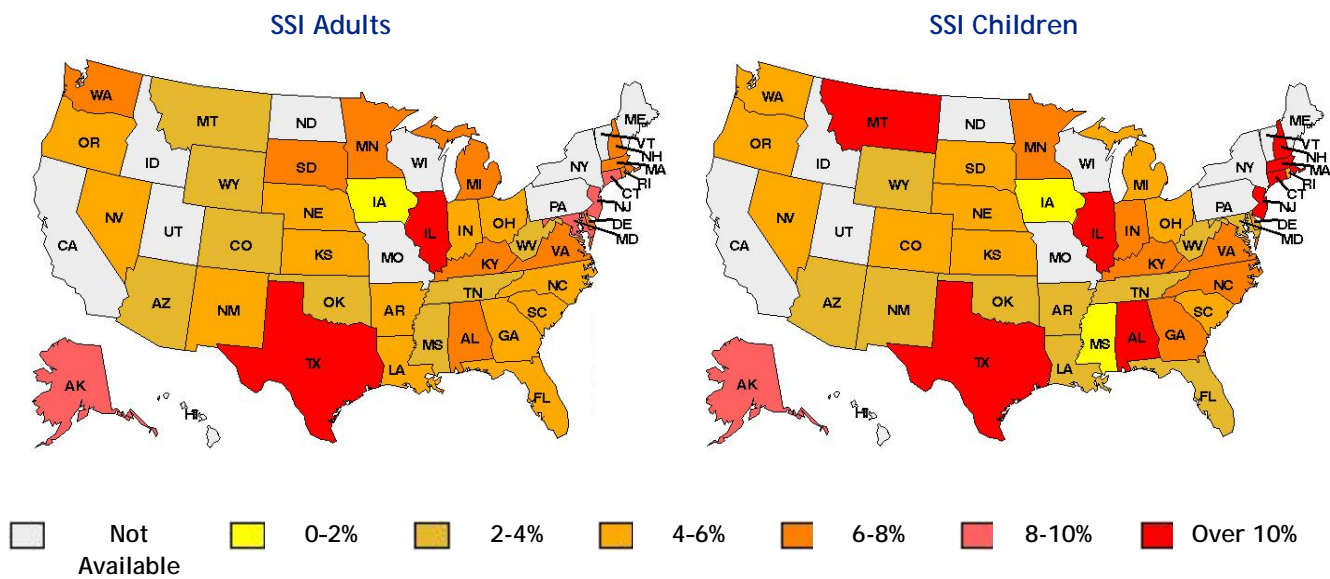
had an average percent of mental health visits less than one percent higher than TANF children. However, this was not always true at the state level (Figure 18). For example, Montana,

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Alabama, and a few of the Northeastern states had a noticeably higher percent of mental health visits for SSI children compared to SSI adults.

Discussion

Since most Medicaid enrollees did not visit the ED during 2008, it is important to focus on the characteristics of those enrollees that had both high rates of ED visits overall, and specifically, characteristics of those enrollees with high rates of potentially avoidable ED visits. Grouping the Medicaid population by eligibility and age categories revealed that adults and SSI enrollees had higher ED utilization rates. Also, the Medicaid populations in more rural areas tended to have higher ED utilization rates than the populations in urban areas. Nevertheless, as we found, high utilization rates did not necessarily translate to high rates of unnecessary ED visits. After categorizing ED visits, we found that TANF adults and TANF children enrollees had a higher percentage of avoidable ED visits and identified the diagnostic reasons that accounted for these visits. With this information, program administrators could target the populations where the percent of avoidable ED visits was high and more specifically, identify the top diagnostic reasons for which Medicaid enrollees visited the ED.

Appendix A
Derivation of a Member's Eligibility Category and Managed Care Status

The Chronic Condition Data Warehouse (CCW) Personal Summary (PS) file was used to determine a member's eligibility group, age category, managed care enrollment and their number of months of Medicaid eligibility during 2008. The CCW variables and the value for each variable used to assign members to categories are provided in the sections below.

Eligibility Category Assignment

The latest CCW eligibility code reported for a member (EL_CCW_ELGBLTY_CD_LTST) was used to assign the member to an eligibility group for those members that were not dually eligible for Medicaid and Medicare. For dually eligible members, the Medicare Dually Eligible code (EL_MDCR_DUAL_ANN) and their original Medicare reason for entitlement (MDCR_ORIG_REAS_CD) was used to assign them to an eligibility group. In the assignment process logic, dually eligibles were assigned first. If a member was not determined to be dually eligible they were assigned to another eligibility category.

The values that were used to identify dually eligible members are provided in Table 1. Several methodologies have been used by users of the CCW data to identify dually eligible recipients. This methodology was selected based upon feedback from other departments within CMS. Researchers may want to consider other methodologies and should discuss alternatives with their project teams. The values contained in the CCW may also change in future years.

Table 1. Variable/Values Used to Identify Medicare-Medicaid Dual Eligible Enrollees

Dual Eligible Category	EL_MDCR_DUAL_ANN values	MDRC_ORIG_REAS_CD values
Dual- Partially Eligible (i.e., QMB/ SLMB)	01, 03, 05, 06, 07, 51, 53, 55, 56, 57	Not used in assignment process
Full Dual – Aged	02, 04, 08, 52, 54, 58	0
Full Dual – Disabled	02, 04, 08, 52, 54, 58	1, 2, 3

The values that were used to identify non-dually eligible members to eligibility categories are provided in Table 2. There are numerous values for the eligibility variables reported in the CCW data that have been derived from state specific eligibility codes. This methodology was selected based upon feedback from other departments within CMS. Researchers may want to consider other methodologies and should discuss alternatives with their project teams. The values contained in the CCW will also be updated in future years.

Eligibility Category	EL_CCW_ELGBLTY_CD_LTST values	EL_CHIP_FLAG_latest *
TANF	14, 15, 16, 17, 34, 35	
MA – Only, Non SSI Related	24, 25, 44, 45	
Waiver	51, 52, 54, 55	
CHIP	14, 15, 16, 17, 34, 35, 44, 45, 54, 55	2, 3

The most recent monthly value for the EL_CHIP_FLAG series of variables was used to determine a member's CHIP status.

Age Category Assignment

A member's age group code (EL_AGE_GRP_CD) was used to assign them to four age categories; Newborn, Children, Adult and Elderly. The values that were used to assign members to each category are provided in Table 3.

Table 3: Variable/Values Used to Identify Age Category

Age Category	EL_AGE_GRP_CD values
Newborn	0
Child	1, 2, 3
Adult	4, 5
Elderly	6, 7, 8
Unknown	Any other value

Managed Care Status

Three variables in the PS file were used to determine care delivery model status: total months of Medicaid enrollment (EL_ELGBLTY_MO_CNT), total months of enrollment in managed care (EL_PPH_PLN_MO_CNT_CMCP), and total months of enrollment in PCCM (EL_PPH_PLN_MO_CNT_PCCM). The number of months an enrollee was enrolled in "FFS" was based on a subtraction of the total number of Medicaid enrollment from the sum of total months of enrollment in managed care and total months of enrollment in PCCM. For this analysis, we used only enrollees who were in each program (FFS, MCO) if the total months of Medicaid enrollment equaled the total number of months enrolled in that care delivery model.

Appendix B
Top Ten Diagnosis Groups in Each ED Category, 2008

Required Diagnoses Groups	Percent of Required*	Potentially Avoidable Diagnoses Groups	Percent of Potentially Avoidable*
Asthma	16.2%	Abdominal pain	28.9%
Chest pain	10.2%	Cellulitis and abscess of face	18.6%
Bronchopneumonia	8.4%	Infections of genitourinary tract	12.0%
Convulsions	6.8%	Threatened abortion unspecified as to episode of care	5.4%
Acute bronchiolitis due to other infectious organisms	4.3%	Other non-emergent chest pain	5.0%
Syncope and collapse	3.7%	Influenza with other respiratory manifestations	3.1%
Croup	4.0%	Essential hypertension	3.0%
Calculus of kidney	2.8%	Diabetes mellitus without complication type 2 (not stated as uncontrolled)	2.6%
Sickle-cell disease unspecified	1.8%	Acute gastritis (without hemorrhage)	2.5%
Sciatica	3.0%	Pulpitis	3.6%

Avoidable Diagnosis Groups	Percent of Avoidable*	Mental Health Diagnosis Groups	Percent of MH*
Acute bronchitis	14.5%	Anxiety state	27.9%
Inflammation of middle ear	8.3%	Depressive disorder	17.3%
Inflammation of throat	7.0%	Paranoid type schizophrenia	11.3%
Voice disturbance (e.g. hoarseness)	5.9%	Bipolar disorder	5.6%
Headache	4.1%	Schizoaffective disorder	2.3%
Epistaxis (Nose Bleed)	4.3%	Major depressive affective disorder single episode	2.5%
Symptoms referable to Back	4.5%	Disturbance of conduct	2.6%
Infectious mononucleosis (Mono)	3.2%	Episodic mood disorder	2.0%
Atopic dermatitis/Eczema (Inflammation of Skin)	3.5%	Dysthymic disorder	1.8%
Noninfectious gastroenteritis and colitis (stomach flu)	2.9%	Hyperkinetic syndrome of childhood	1.7%

*Based on the average percent for all 39 states.

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