AVOIDABLE EMERGENCY DEPARTMENT VISITS: DIFFERENCES BETWEEN TEXAS AND WASHINGTON MEDICAID ENROLLEES

BIDISHA MANDAL
Washington State University

ABSTRACT

Administrative claims data from 2012 are used from Texas and Washington State to understand state differences in the likelihood of non-urgent emergency department utilization prior to the implementation of the Affordable Care Act. Texas is currently the largest state that has opted to not expand Medicaid. Washington State has expanded Medicaid, and it had more generous pre-expansion Medicaid income eligibility criterion compared to Texas. I find that emergency department use for non-urgent reasons was higher in Texas compared to the state of Washington in 2012. Additionally, in Texas, there was a disproportionately high demand for obstetric services that are typically provided in outpatient settings. Non-urgent emergency department demand was associated with disruption in Medicaid coverage in both states. In Texas, especially, Medicaid coverage disruption and rural area residency were associated with higher likelihood of emergency department use for emergent but primary care treatable reasons.

Keywords: Emergency department; Medicaid; Women's health; Churning

Acknowledgement: The researcher is grateful for funding from the Research Initiative in Human Sciences Internal Grant Program that allowed the purchase of administrative data from the Centers for Medicare and Medicaid Services for this study.

Institutional Review Board approval was received prior to obtaining data from the Centers for Medicare and Medicaid Services.

Medicaid is the primary source of health insurance for low-income individuals in the United States (US). States have wide latitude in how the program is administered. One of the key differences among states is the income eligibility criteria for Medicaid coverage. The objective of this study is to examine the aggregate use of emergency departments for non-urgent reasons in two states. These two states, Texas and Washington, have similar population-level income distributions but different Medicaid eligibility criteria. There are two main contributions of this study. First, it helps identify a sub-population of low-income individuals, women of reproductive age, in Texas that has much to gain from expanded coverage. Second, I find that disruption in Medicaid coverage due to income volatility, which will continue under the Affordable Care Act, is positively associated with non-urgent emergency department use.

An increase in the use of primary and preventive care, combined with a decrease in the use of emergency departments for non-urgent reasons by the insured, and a reduction in uncompensated care expenditures generated by the uninsured, is often used as an argument to support expansion of the public health program. One of the goals of the Affordable Care Act's Medicaid expansion in 2014 was to eliminate the historical differences in categories of Medicaid eligibility among states and extend Medicaid eligibility to all individuals with incomes up to 138% of the federal poverty level. However, due to the 2012 Supreme Court ruling, inconsistent coverage policies continue in the US as some states have adopted the expansion while others have not. I use pre-expansion data for the comparative analysis since these are the latest Medicaid administrative claims data available from Texas. Additionally, there were already differences in eligibility criterion between the two states in 2012, and the gap in the insured has only increased since the state of Washington expanded Medicaid in 2014

and Texas is currently the largest state that has not adopted the expansion.

Texas and Washington State have comparable income distributions. In other words, if the same Medicaid eligibility criterion is used in both states, a similar distribution of individuals would be eligible for Medicaid benefits in Texas and Washington State. However, they differ in Medicaid income eligibility levels. The rate of reimbursement to physicians providing care to Medicaid patients is also different. Prior to Medicaid expansion, as analyzed in this study, the income eligibility level for parents was 73% in Washington and 26% in Texas. Medicaid fee indices for primary care and obstetric care were also different between the two states in 2012. They were, respectively, 0.98 and 0.77 in Texas, and 1.16 and 1.38, respectively in Washington. Previous studies have shown that low Medicaid reimbursement fees discourage physician participation (Cunnigham and Nichols, 2005; Cunnigham and O'Malley, 2009).

Using administrative Medicaid claims data from emergency department (ED) visits from Texas and Washington in 2012, I determine that the likelihood of non-urgent ED visits was significantly higher in Texas. I also find that a disproportionately high demand for emergency departments in Texas was among women of reproductive age for obstetric services that could be safely and effectively provided in outpatient settings. Another important and policy-relevant finding is that high use of emergency departments for non-urgent reasons was positively associated with churning or disruption in Medicaid coverage due to income volatility. Compared to Washington, Medicaid churning was more common in Texas due to its more stringent income eligibility criterion. Previous studies have shown that churning is associated with lower costs of care for chronic diseases, an increase in preventive care utilization, and a lower likelihood of emergency department

visits and hospital admissions (Gill et al. 2000; Hussey et al. 2014).

DATA

This study uses Medicaid Analytic eXtract (MAX) data from January 1, 2012 to December 31, 2012 from the states of Texas and Washington. As of the date of writing this paper, the latest administrative Medicaid claims data are available from 2012 for Texas, and from 2013 for the state of Washington. For comparison purposes, 2012 data are analyzed. These data are available from the Centers for Medicare and Medicaid Services. Each row of the data corresponds to a claim. Since multiple claims may be generated from a single visit, the claims data are first converted into visits data. I, then, analyze ED visits throughout this study.

There are several benefits to using administrative data. First, these data include information from all Medicaid beneficiaries. Information regarding health care utilization under the Medicaid program are precise. Complete records of inpatient and outpatient visits, including diagnoses and location of medical care utilization, are available. The data include duration of Medicaid coverage, demographic information (age, gender, and race), and beneficiary's residential zip-code. However, it does lack socio-economic information, such as, income, education, and labor market status. There is also no information regarding how individuals choose a provider or type of care, measures of satisfaction with medical care provider or prescribed care, any health care use outside the Medicaid program, pre-existing health conditions, or information on health-related behaviors (such as, smoking and physical activity).

The main outcome variable is avoidable ED use. Non-urgent ED utilizations are unnecessary and costly to public health care programs (Uscher-Pines et al., 2013). The

rate of use of emergency departments is twice as high among Medicaid beneficiaries compared to privately insured individuals (Garcia et al., 2010). I use an algorithm, developed by the New York University Center for Health and Public Service Research[1], to classify ED utilization corresponding to each medical visit (Johnston et al., 2017). Using the algorithm, I map the primary diagnoses code corresponding to the first claim within an emergency department visit in the MAX data to type of ED use. There are several categories of utilization – (i) non-emergent, (ii) emergent but primary care treatable, (iii) emergent but preventable or avoidable if timely and effective ambulatory care had been received during the episode of the illness, (iv) emergent and ED care needed, (v) mental health related, (vi) alcohol related, (vii) substance abuse related, (viii) injury related, or (ix) unclassified.[2] Corresponding to each category of ED utilization, the algorithm assigns a value between zero and one (including these) to indicate the probability of a medical visit being of that type of ED use. In this study, I consider ED utilization for non-emergency reasons or for emergency reasons that are primary care treatable to be avoidable ED use.

In Table 1, I describe the data from non-dual, non-elderly Medicaid adults. Mean and standard deviation (in parenthesis) are presented corresponding to the continuous variables, corresponding percentages are shown for the indicator variables. There were 649,909 ED visits in Texas and 304,924 ED visits in the state of Washington in 2012. These ED visits constituted 10.73% and 10.64% of all inpatient and outpatient visits in Texas and Washington, respectively. Percentage of these ED visits which were assigned an exact probability of one for being either non-

[1] NYU Center for Health and Public Service Research. Available at https://wagner.nyu.edu/faculty/billings/nyued-background#

[2] The 2012 MAX files include International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes for each medical visit

emergent or emergent but primary care treatable were 6.92% in Texas and 5.30% in Washington. Demographic characteristics of Medicaid beneficiaries with ED visits are also shown in Table 1. The distribution of non-elderly adults with Medicaid by race and gender in the two states, using 2008-2017 data from the Census Bureau's American Community Surveys, are as follows.[3] In Texas, the race distribution is 21% white, 16% black, 59% Hispanic, and 4% other. In Washington, the race distribution is 55% white, 6% black, 24% Hispanic, and 15% other. Gender distribution is 41% male and 59% female in Texas, and 45% male and 55% female in Washington. The race and gender distributions in ED data in 2012 as shown in Table 1, thus, match the distribution of overall non-elderly Medicaid populations within each state.

Two other covariates are used in this study – urban area residency and Medicaid churning. Metropolitan core areas and metropolitan areas with both low and high commuting flows are considered as urban areas. Urban area residency status was determined by linking Medicaid enrollee's zip-code to its rural-urban commuting area code.[4] Approximately 86% of the beneficiaries with ED visits lived in urban areas in both states. I control for urban area residency because previous research has shown that distance and transportation are major concerns in accessing health care among rural residents (Reif et al., 1999; Ricketts, 2000). Additionally, likelihood of hospital closures is greater in rural areas with increase in uninsurance rates (Kaufman et al., 2016; Lindrooth et al., 2018; Thomas et al., 2016). Health care needs and health insurance coverage profiles are considerably different between rural and urban residents (Newkirk and Damico, 2014). Rural residents are more

[3] These statistics are available from Henry J Kaiser Family Foundation website: https://www.kff.org/medicaid/state-indicator/

[4] These codes are available from the Rural Health Research Center: http://depts.washington.edu/uwruca/ruca-data.php

likely to be disproportionately affected by their state's decision to expand Medicaid under the Affordable Care Act (ACA), as a larger share of rural residents are low-to-moderate income families and the target population for the ACA reforms (Douthit et al., 2015; Newkirk and Damico, 2014).

Medicaid churning is the transitioning in and out of benefit coverage due to income eligibility changes, resulting in care discontinuity. In these data, 6.58% of Medicaid beneficiaries in Washington experienced churning, while 8.82% Medicaid beneficiaries in Texas experienced churning in 2012. Whether a beneficiary experienced churning is deduced from observing exit and then re-entry into the Medicaid program in the 2012 dataset. Understanding the role of churning in avoidable ED utilization is important from a policy perspective. A decrease in churning is associated with lower costs of care for chronic diseases, increase in preventive care utilization, and lower likelihood of emergency department visits and hospital admissions (Gill et al. 2000; Hussey et al. 2014). Bindman et al. (2008) have found that discontinuity in Medicaid coverage results in significantly higher risk for hospitalization for heart failure, diabetes, and chronic obstructive pulmonary disease. Hall et al. (2008) have found that disruption in Medicaid coverage results in higher medical expenditures post-lapse compared to pre-lapse among individuals with diabetes. However, a recent study (Roberts and Pollack, 2016) did not find any evidence of greater use of emergency departments among Medicaid enrollees following reenrollment.

Table 1
Characteristics of non-dual Medicaid enrollees, 18-64 years

Variables	All ED visits	
	Texas	Washington
Number of ED visits	649,909	304,924
% ED out of all ED and non-ED visits	10.73%	10.64%
% Avoidable ED visits[5]	6.92%	5.30%
[*P*(Non-emergent)] × *100*	23.66 (35.19)	22.63 (34.82)
[*P*(Emergent but primary care treatable)]× *100*	24.54 (28.46)	22.09 (27.22)
Age, years	35.02 (13.81)	36.66 (13.01)
Male	24.99%	32.51%
White non-Hispanic	35.11%	70.12%
Black non-Hispanic	28.40%	11.90%
Hispanic	35.31%	6.18%
All other race/ethnicity	10.78%	15.80%
Urban area residency	85.58%	87.69%
Experienced churning	8.82%	6.58%

METHODS AND RESULTS

The primary research question explored in this study is whether the rate of avoidable ED use among Medicaid beneficiaries in Texas differed from the corresponding rate in Washington State in 2012. Texas is chosen for two reasons. First, Texas is currently one of largest states that is not planning to expand Medicaid under the Affordable Care Act (ACA). Second, data from 2008-2016 on hospital closures show that ACA's Medicaid expansion is associated with a lower likelihood of closure in rural areas and in counties with a large number of uninsured adults in the pre-expansion period (Lindrooth et al., 2018). Washington is

[5] ED visits with an associated probability of one for non-emergent or emergent but primary care treatable primary diagnoses are considered avoidable.

selected for this study because it is similar to Texas in income distribution, percentage of land area that is rural (96.6% in Texas and 96.4% in Washington), and rural population percent (15.3% in Texas and 15.9% in Washington).[6] In 2012, the county-level mean family income average was $60,972.36 in Texas and $62,799.28 in Washington.[7] In other words, if a similar level of Medicaid eligibility criterion is used across the two states, a similar distribution of individuals would likely be eligible for Medicaid benefits in Texas and Washington.

There are important differences, however, between the two states that allow me to explore the role of Medicaid coverage on avoidable ED visits. Prior to ACA's Medicaid expansion, as analyzed in this study, the income eligibility level for parents was 73% in Washington and 26% in Texas.[8] For pregnant women, Texas was somewhat more generous in its income eligibility level. They were 185% and 200%, respectively, in Washington and Texas. However, since July 2001, the state of Washington has had a Medicaid family planning waiver that provides reproductive health and family planning services to low-income men and women (up to family income at or below 200%) who do not otherwise qualify for the Medicaid program.[9] This end-result is that the income eligibility level for pregnant women to receive Medicaid benefits was similar in the two states. Medicaid fee indices for primary care and obstetric care in Texas in

---

[6] Data are from the US Bureau of the Census, 2010 Census of Population. Available at http://www.census.gov/geo/www/ua/2010urbanruralclass.html

[7] Family income data are from the US Census Bureau, American Community Survey 2009-2013. Available at https://factfinder.census.gov/faces/tableservices/jsf/pages/. A two-sample Kolmogorov-Smirnov test failed to reject the null hypothesis of similar income distributions (statistic = 0.16; p-value = 0.37).

[8] These data are available at: https://www.kff.org/data-collection/trends-in-medicaid-income-eligibility-limits/

[9] Approximately 1.3% of individuals in the data from the state of Washington participated in this family planning program. None of the results change if these individuals are excluded from these analyses.

2012 were 0.98 and 0.77, respectively. In comparison, Washington was more generous in reimbursing physicians providing primary care and obstetric care with Medicaid fee indices at 1.16 and 1.38, respectively. Therefore, there was a difference in Medicaid physician fees between the two states, especially for obstetric care.[10] Using 2011 data from National Ambulatory Medical Care Survey and 2012 data from National Electronic Health Records Survey, Decker (2013) has found that the acceptance rate of new Medicaid patients was similar across Texas and Washington State among primary care physicians, but the rate was higher among other specialties in the state of Washington compared to Texas. Past studies have shown that low reimbursement rates and reimbursement delays discourage physician participation in Medicaid (Cunnigham and Nichols, 2005; Cunnigham and O'Malley, 2009) and creates a disincentive for physicians to accept new Medicaid patients, creating a barrier to health care access among low-income public-insured individuals (Baker and Royalty, 2000; Brunt and Jensen, 2014; Decker, 2011). Specifically, reduced access to primary care providers can increase avoidable use of emergency departments (Richman et al., 2007).

Multiple factors are likely to be associated with ED utilization, among them, current and past health status, access to health care, and difference in perception of urgency between patients and physicians (DeLia and Cantor, 2009). None of these information are available in the administrative MAX dataset. Thus, a limitation of the current research is that while it is possible to test for difference in rate of avoidable ED use between Texas and Washington, a detailed explanation for the difference is not possible. In other words, controlling for a limited set of exogenous factors – demographic characteristics of Medicaid beneficiaries, their

[10] These data are available at: https://www.kff.org/medicaid/issue-brief/how-much-will-medicaid-physician-fees-for/

residential locations, and if they experienced churning, the difference in rate of avoidable ED utilization between Texas and Washington is precisely estimated using the large dataset. However, the R^2 values in the regression models of avoidable ED utilization are small (approximately 0.01) as these independent variables do not sufficiently explain health care utilization. Thus, I do not expect to be able to predict ED utilization using these models. These models are, however, suitable for answering the primary research question of whether there is a statistically significant difference in prevalence of avoidable ED visits between Texas and Washington Medicaid enrollees. In the regression analyses, a state dummy variable is used to test this central hypothesis. Due to collinearity it is not possible to include state-level variables. I acknowledge that it is quite possible that reasons other than income eligibility criteria and physician reimbursement fees could be related to differential use of emergency departments.

I analyze data from all ED visits. There are three outcome variables. The first outcome variable is whether the ED visit was avoidable. ED visits are designated as avoidable if the algorithms assigned them an exact probability of one for being either non-emergent or emergent but primary care treatable. I use a linear probability regression model to estimate state difference in prevalence of avoidable ED visits.[11] The outcome variable is the ED visit non-emergent, and the third outcome variable is the ED visit emergent but primary care treatable. Corresponding to each outcome variable, I estimate two regression models – one with only the main effects and another including interaction effects. Interactions between state and urban residency, and between state and churning are considered. I calculate clustered standard errors, where the clustering is

[11] Estimates from the linear probability models are similar to the estimates from probit regression models. However, linear probability models are preferred for interpretation of interaction effects.

done at the county-level. The results are shown in Table 2. In the last row of Table 2, I show results from t-tests. Estimated difference between the two states and corresponding standard errors are presented. While difference between the two states could be calculated using t-tests, they only present the unconditional difference between two groups and do not allow inclusion of covariates or clustering of standard errors.

The rate of avoidable ED visits is 1.3 percentage-point higher in Texas compared to the state of Washington, and this difference is statistically significant at 99% confidence level. Avoidable ED visits are more prevalent among Medicaid beneficiaries living in urban areas. Older beneficiaries and male beneficiaries are less likely to have avoidable ED visits, while black non-Hispanic beneficiaries are more likely than white non-Hispanic beneficiaries to have avoidable ED visits. I do not find any association between churning and likelihood of avoidable ED visits. Upon including interactions, I find that the urban-rural difference is 0.8 percentage-point greater in Texas compared to Washington State. This difference is statistically significant at 99% confidence level.

The second outcome variable is probability of non-emergent ED visit. Here, I do not find any state difference, but the main effect of churning is positive and statistically significant at 99% confidence level. Churning increases the likelihood of non-emergent ED visit by 0.41 percentage-point. There is no differential effect of churning by state. I also find that Hispanic beneficiaries are less likely to have non-emergent ED visit compared to white non-Hispanic beneficiaries.

The third outcome variable is probability of ED visit for reasons that are emergent but primary care treatable. The likelihood of this type of ED visits is higher in Texas, by 1.9 percentage-point. Interestingly, the likelihood of this type of ED visits is higher among Medicaid beneficiaries residing in

rural areas – by 0.7 percentage-point, compared to their urban counterparts. However, the urban-rural difference is less in Texas compared to Washington – by 1.3 percentage-point. The likelihood of ED visits for reasons that are emergent but primary care treatable is higher among those who experience churning – by 0.6 percentage-point. Here, the differential effect of churning is higher in Texas compared to Washington – by 0.9 percentage-point. On average, the likelihood of this type of ED visits is greater among Hispanic beneficiaries and lesser among other race-ethnicity beneficiaries compared to white non-Hispanic beneficiaries.

Table 2
Estimates from regression models of avoidable ED visit; N = 867,636

Independent variables	Dependent variable					
	P(Non-emergent) or *P*(Emergent but primary care treatable) = 1		[*P*(Non-emergent)]× *100*		[*P*(Emergent but primary care treatable)]× *100*	
Texas	0.013***	0.006***	0.532	0.579	1.886***	2.969***
	(0.002)	(0.002)	(0.462)	(0.734)	(0.339)	(0.489)
Urban area residency	0.004**	–0.001	–0.241	–0.205	–0.745***	0.185
	(0.002)	(0.002)	(0.347)	(0.715)	(0.219)	(0.514)
Texas × Urban		0.008***		–0.051		–1.333**
		(0.003)		(0.877)		(0.591)
Experienced churning	0.001	0.003	0.407**	0.434	0.603***	–0.065
	(0.001)	(0.002)	(0.156)	(0.342)	(0.128)	(0.200)
Texas × Churning		–0.003		–0.037		0.905***
		(0.003)		(0.362)		(0.234)
Age	–0.001***	–0.001***	–0.126***	–0.126***	–0.070***	–0.070***
	(0.0001)	(0.0001)	(0.006)	(0.006)	(0.004)	(0.004)
Male	–0.024***	–0.024***	–3.503***	–3.503***	–3.055***	–3.049***
	(0.001)	(0.001)	(0.216)	(0.215)	(0.141)	(0.141)
Black non-Hispanic	0.004***	0.004***	2.033***	2.033***	0.336	0.349
	(0.002)	(0.002)	(0.393)	(0.389)	(0.221)	(0.223)
Hispanic	0.001	0.001	–1.128***	–1.126***	0.582**	0.613**
	(0.002)	(0.002)	(0.372)	(0.374)	(0.262)	(0.261)
Other race/ethnicity	0.001	0.001	–0.291	–0.290	–0.771***	–0.752***
	(0.002)	(0.002)	(0.196)	(0.196)	(0.257)	(0.257)
Intercept	0.089***	0.094***	28.440***	28.407***	26.253***	25.469***
	(0.003)	(0.003)	(0.565)	(0.782)	(0.317)	(0.448)
F-statistic	98.76***	77.42***	199.61***	172.72***	167.25***	140.14***
Two sample t-test	0.016*** (0.0005)		1.031*** (0.077)		2.446*** (0.062)	

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Notes: R^2 is 0.01 in each model. Clustered standard errors, in parenthesis, were estimated where clustering was done at the county-level. Two sample t-test results shown in the last row are estimated difference between Texas and Washington States, and corresponding non-clustered standard error is shown in parenthesis.

In Table 3, I list the ICD-9-CM codes and description of the five most prevalent diagnoses in non-emergent ED visits and of the five most prevalent diagnoses in ED visits that are emergent but primary care treatable. In the former case, the most prevalent diagnoses were the same (albeit differently ranked) in the two states. In the latter case, four of the five most prevalent diagnoses were the same in Texas and Washington State. The difference is that ICD-9-CM code *V22.1* (Supervision of other normal pregnancy) was among the top five in Texas but ranked fifteenth in Washington State. ICD-9-CM code *V787.20* (Dysphagia, unspecified) was among the top five in Washington State, and ranked eighth in Texas. The most common non-emergent reason for ED use in Texas was for ICD-9-CM code *648.93* (Other current conditions classifiable elsewhere of mother, antepartum condition or complication), and the incidence was disproportionately high in that 34.5% of all non-emergent ED visits in Texas were contributed to this condition. Thus, overall, there was a high demand for emergency departments in Texas among women of reproductive age for obstetric services that are safely and effectively provided in outpatient settings.

Overall, there were 35,904 non-emergent ED visits in Texas in 2012 by non-dual, non-elderly Medicaid beneficiaries. There were 12,470 such ED visits in the state of Washington. Of these, 68.11% and 59.31% visits constituted the five most common reasons for non-emergent ED visits in Texas and Washington State, respectively. There were 9,081 ED visits for emergent but primary care treatable reasons in Texas and 3,683 visits in Washington State. Of these, 45.15% and 42.98% visits constituted the five most common reasons for ED visits for emergent but primary care treatable reasons in Texas and Washington State, respectively.

In Table 4, I present a comparison of the two states in regards to incidences of the most common reasons of

avoidable ED use in non-ED data. First, I discuss the five most common non-emergent reasons of ED visits. There were 118,454 such visits in Texas and 42,466 visits in Washington. In Texas, 20.65% of the visits were reported in an emergency department, and the remaining 79.35% of the visits were to a non-ED location. In Washington State, 17.42% of the visits were to emergency departments and 82.58% were to non-ED locations. Controlling for demographic characteristics, residential location, and churning, the difference between Texas and Washington in the percentage of top five non-emergent cases being reported in ED versus non-ED is statistically significant at 99% confidence level. Corresponding regression results are shown in the Appendix.

Next, I consider the four most prevalent emergent but primary care treatable reasons for ED use that were common to both states. There were 14,078 total visits for these reasons in Texas, and 6,513 total visits in Washington State. In Texas, 22.49% of the visits were reported in EDs and remaining 77.51% in non-ED locations. In Washington State, 21.56% of the visits were reported in EDs and remaining 78.44% in non-ED locations. The percentages reported in ED did not differ significantly between the two states.

Table 3
Top five primary diagnoses in avoidable emergency department visits

Non-emergent			Emergent but primary care treatable		
ICD-9-CM code and description	Texas	Washington	ICD-9-CM code and description	Texas	Washington
648.93: *Other current conditions classifiable elsewhere of mother, antepartum condition or complication*	34.48%	14.60%	786.51: *Precordial pain*	14.84%	14.09%
625.9: *Unspecified symptom associated with female genital organs*	15.20%	19.32%	V22.1: *Supervision of other normal pregnancy*	10.29%	[1.63%]
461.9: *Acute sinusitis, unspecified*	7.62%	6.13%	379.91: *Pain in or around eye*	7.37%	8.34%
719.45: *Pain in joint, pelvic region and thigh*	5.73%	11.04%	569.3: *Hemorrhage of rectum and anus*	6.75%	8.06%
782.0: *Disturbance of skin sensation*	5.08%	8.23%	704.8: *Other specified diseases of hair and hair follicles*	5.90%	7.63%
			787.20: *Dysphagia, unspecified*	[3.08%]	4.86%
Total number of top five diagnoses	24,457	7,396	Total number of top five diagnoses	4,100	1,583
Total number of non-emergent visits	35,904	12,470	Total number of emergent but primary care treatable visits	9,081	3,683

Note: % in brackets indicate that the corresponding condition is not among the top five most prevalent reasons for ED visits in that state.

Table 4
Incidence of most prevalent primary diagnoses in avoidable ED use in non-ED data

Most prevalent avoidable ED diagnoses	Texas		Washington	
	ED	Non-ED	ED	Non-ED
Is top 5 non-emergent	24,457	93,997	7,396	35,070
Not top 5 non-emergent	625,452	5,310,943	297,528	2,525,675
Is top 4 emergent but primary care treatable	3,166	10,912	1,404	5,109
Not top 4 emergent but primary care treatable	646,743	5,394,028	303,520	2,555,636

DISCUSSION

At the beginning of this research, the main reasons for non-urgent ED use in Texas and Washington states were not known. The primary objective of the research was to compare rates of avoidable ED use in two states, pre-ACA expansion, with similar population-level income distributions but different Medicaid eligibility criteria and physician-reimbursement rates. I found that ED use for non-urgent reasons was higher in Texas compared to Washington in 2012. The most common non-emergent use of ED in Texas was for antepartum condition. More than a third of all non-emergent ED visits in Texas were due to this reason,

compared to around 15% of non-emergent ED visits in Washington for antepartum condition. Among emergent but primary-care treatable conditions, supervision of normal pregnancy was among the top five reasons for ED use in Texas, but that was not the case in Washington. Thus, it appears that women of reproductive age were especially disadvantaged in Texas, as there was a disproportionately high demand for obstetric services that are typically provided in outpatient settings.

The majority of non-elderly adult Medicaid beneficiaries, before the ACA and currently, are women, and approximately two-thirds of Medicaid-enrolled adult women are in their reproductive years (Kaiser Family Foundation, 2017). While Medicaid benefits span a wide range of reproductive health care services, there are variations in coverage policies across the country since Medicaid is administered by states. For instance, non-expansion puts 22% of women in Texas in the Medicaid coverage gap (Kaiser Family Foundation, 2018); in other words, these women would qualify for Medicaid if they lived in an expansion state. Given that Medicaid eligibility criteria for pregnant women were similar across the two states in 2012, higher ED use for primary-care available obstetric services could be driven by lower physician-reimbursement rate in Texas. Another important finding is that non-urgent ED demand was positively associated with disruption in Medicaid coverage. In Texas, Medicaid disruption and rural area residency were associated with higher likelihood of ED use for emergent but primary care treatable reasons.

The findings in this study are based on data from a pre-expansion year. However, the gap between the two states could be larger now than in 2012 since the state of Washington expanded Medicaid under the Affordable Care Act in 2014 and Texas did not. Additionally, of the ninety-five rural hospital closures since January 2010, sixteen have

been in Texas.[12] Johnston et al. (2018) found that the ACA's Medicaid expansion decreased uninsurance among low-income women of reproductive age by 13.2-percentage points, along with a 3.8-percentage point reduction in the likelihood of experiencing a cost barrier to care among all women. While the use of large administrative data is efficient in showing that a significant difference exists between the two states, the data do not contain important individual-level information regarding patients' current and prior health status, access to health care, education levels, and health care use outside the Medicaid program. These factors are likely to be associated with all types of health care utilization. This is an important limitation of the study.

[12] These statistics are available at http://www.shepscenter.unc.edu/programs-projects/rural-health/rural-hospital-closures/

REFERENCES

Baker, L. C., & Royalty, A. B. (2000). Medicaid policy, physician behavior, and health care for the low-income population. *Journal of Human resources*, *35*(3), 480-502.

Bindman, A. B., Chattopadhyay, A., & Auerback, G. M. (2008). Interruptions in Medicaid coverage and risk for hospitalization for ambulatory care–sensitive conditions. *Annals of Internal Medicine*, *149*(12), 854-860.

Brunt, C. S., & Jensen, G. A. (2014). Payment generosity and physician acceptance of Medicare and Medicaid patients. *International Journal of Health Care Finance and Economics*, *14*(4), 289-310.

Cunningham, P. J., & Nichols, L. M. (2005). The effects of Medicaid reimbursement on the access to care of Medicaid enrollees: a community perspective. *Medical Care Research and Review*, *62*(6), 676-696.

Cunningham, P. J., & O'Malley, A. S. (2009). Do reimbursement delays discourage Medicaid participation by physicians?. *Health Affairs*, *28*(1), w17-w28.

Decker, S. L. (2012). In 2011 nearly one-third of physicians said they would not accept new Medicaid patients, but rising fees may help. *Health Affairs*, *31*(8), 1673-1679.

DeLia, D., & Cantor, J. C. (2009). Emergency department utilization and capacity. *The Synthesis Project. Research synthesis report*, (17), 1-11.

Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural USA. *Public Health*, *129*(6), 611-620.

Garcia, T. C., Bernstein, A. B., & Bush, M. A. (2010). *Emergency department visitors and visits: who used the emergency room in 2007?* (No. 38). US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

Gill, J. M., Mainous III, A. G., & Nsereko, M. (2000). The effect of continuity of care on emergency department use. *Archives of Family Medicine*, *9*(4), 333.

Hall, A. G., Harman, J. S., & Zhang, J. (2008). Lapses in Medicaid coverage: impact on cost and utilization among individuals with diabetes enrolled in Medicaid. *Medical Care*, *46*(12), 1219-1225.

Hussey, P. S., Schneider, E. C., Rudin, R. S., Fox, D. S., Lai, J., & Pollack, C. E. (2014). Continuity and the costs of care for chronic disease. *JAMA Internal Medicine*, *174*(5), 742-748.

Johnston, K. J., Allen, L., Melanson, T. A., & Pitts, S. R. (2017). A "Patch" to the NYU emergency department visit algorithm. *Health Services Research*, *52*(4), 1264-1276.

Johnston, E. M., Strahan, A. E., Joski, P., Dunlop, A. L., & Adams, E. K. (2018). Impacts of the Affordable Care Act's Medicaid expansion on women of reproductive age: Differences by parental status and state policies. *Women's Health Issues*, *28*(2), 122-129.

Kaiser Family Foundation. (2017). Medicaid's role for women. Factsheet June 2017. https://www.kff.org/womens-health-policy/fact-sheet/medicaids-role-for-women/

Kaiser Family Foundation. (2018). Women's health insurance coverage. Factsheet December 2018. https://www.kff.org/womens-health-policy/fact-sheet/womens-health-insurance-coverage-fact-sheet/

Kaufman, B. G., Reiter, K. L., Pink, G. H., & Holmes, G. M. (2016). Medicaid expansion affects rural and urban hospitals differently. *Health Affairs*, *35*(9), 1665-1672.

Lindrooth, R. C., Perraillon, M. C., Hardy, R. Y., & Tung, G. J. (2018). Understanding the relationship between Medicaid expansions and hospital closures. *Health Affairs*, *37*(1), 111-120.

Newkirk, V., & Damico, A. (2014) The Affordable Care Act and insurance coverage in rural areas. *The Kaiser Commission on Medicaid and the Uninsured, May* 29 (2014). http://kff.org/uninsured/issue-brief/the-affordable-care-act-and-insurance-coverage-in-rural-areas

Reif, S. S., DesHarnais, S., & Bernard, S. (1999). Rural health research community perceptions of the effects of rural hospital closure on access to care. *The Journal of Rural Health*, *15*(2), 202-209.

Richman, I. B., Clark, S., Sullivan, A. F., & Camargo Jr, C. A. (2007). National study of the relation of primary care shortages to emergency department utilization. *Academic Emergency Medicine*, *14*(3), 279-282.

Ricketts, T. C. (2000). The changing nature of rural health care. *Annual review of public health*, *21*(1), 639-657.

Roberts, E. T., & Pollack, C. E. (2016). Does churning in Medicaid affect health care use?. *Medical care*, *54*(5), 483.

Thomas, S. R., Holmes, G. M., & Pink, G. H. (2016). To what extent do community characteristics explain differences in closure among financially distressed rural hospitals?. *Journal of Health Care for the Poor and Underserved*, *27*(4), 194-203.

Uscher-Pines, L., Pines, J., Kellermann, A., Gillen, E., & Mehrotra, A. (2013). Deciding to visit the emergency department for non-urgent conditions: a systematic review of the literature. *The American Journal of Managed Care*, *19*(1), 47.

Appendix:
Regression results of ED and non-ED utilization for most common reasons of avoidable ED use; *N* = 8,079,313

Independent variables	Estimates (SE)	Main effects (SE)
State	0.004 (0.005)	0.005 (0.006)
Non-emergent	0.068*** (0.007)	0.091*** (0.005)
Emergent, primary care treatable	0.111*** (0.014)	0.116*** (0.009)
State × Non-emergent	0.035*** (0.009)	
State × Emergent, primary care treatable	0.007 (0.018)	
Urban area residency	0.014*** (0.005)	0.014*** (0.005)
Churning	0.023*** (0.001)	0.023*** (0.001)
Age	−0.0004*** (0.0001)	−0.0004*** (0.0001)
Male	0.020*** (0.002)	0.020*** (0.002)
Black non-Hispanic	0.017*** (0.006)	0.017*** (0.006)
Hispanic	−0.032*** (0.005)	−0.032*** (0.005)
Other race/ethnicity	−0.021*** (0.007)	−0.021*** (0.007)
Intercept	0.108*** (0.006)	

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.
Notes: Clustered standard errors were estimated where clustering was done at the county-level. Data from all ED and non-ED visits are used. R^2 is 0.01.