WhitePaper

Emergency Room Visits in North Texas:

A Comprehensive Overview and Frequent Flyer Analysis to Identify Disparities

A research summary from the Dallas-Fort Worth Hospital Council Foundation

DFWHC FOUNDATION

www.dfwhcfoundation.org

Principal Investigator and Corresponding Author
Dr. Sushma Sharma
Director Public and Population Health
ssharma@dfwhcfoundation.org

Emergency Room Visits in North Texas:

A Comprehensive Overview and Frequent Flyer Analysis to Identify Disparities

Sushma Sharma, Ed Schmitt, Theresa Mendoza, Kristin Jenkins
Dallas-Fort-Worth Hospital Council Foundation

Principal Investigator and Corresponding Author
Dr. Sushma Sharma
Director Public and Population Health
DFWHC Foundation
250 Decker Drive
Irving, TX 75062

Recommended citation:
Sharma S, Schmitt E, Mendoza T and Jenkins K. Emergency Room Visits in North Texas: A Comprehensive Overview and Frequent Flyer Analysis to Identify Disparities. Published by the Dallas-Fort-Worth Hospital Council Foundation. November 2013.

Table of Contents

Executive Summary

In 1986, the Emergency Medical Treatment and Labor Act (EMTALA) provided a legal right to everyone in the U.S. to emergency care. Emergency care services soon became unique healthcare facilities because services were provided to everyone regardless of insurance or ability to pay.

Emergency departments have been labeled as a "Safety Net," since they were the last healthcare resort for millions of uninsured patients and people with no adequate access to alternate healthcare. According to the Centers for Disease Control and Prevention (CDC), nationally "Safety Net" emergency departments (EDs) are facilities that provide more than 30% of total ER visits to persons with Medicaid, more than 30% of total ER visits to uninsured individuals, or a combined Medicaid and uninsured patient population greater than 40%. Due to this unique payer structure of ER services, the cost of care and its financial burden has been debated across the nation.

In recent years, the increasing healthcare cost has been the most common topic of economic, political and medical discussion. The excessive and sometimes inappropriate use

Executive Summary continued

of emergency room (ER) services has become a common problem leading to overcrowding and financial burden. Socio-economic, demographic, cultural and environmental disparities have been reported as being a determinant of excessive ER use. The lack of integrated patient data registries and the restricted access to healthcare information has been the biggest barrier for future planning and cost estimation of healthcare and emergency services.

North Texas has a unique patient data warehouse created by 80 hospitals. Securely hosted by the Dallas-Fort Worth Hospital Council Foundation (DFWHC Foundation), it is capable of providing information regarding ER usage, charges and disparities. In order to investigate ER usage in North Texas, we extracted information from DFWHC Foundation's data warehouse for "out-patients" who visited ER in 2010-2012. Spatial analysis using GIS mapping with the ER data was used for the frequent flyer analysis to identify the patients with the most ER visits, or frequent flyer patients.

Research objectives were to:

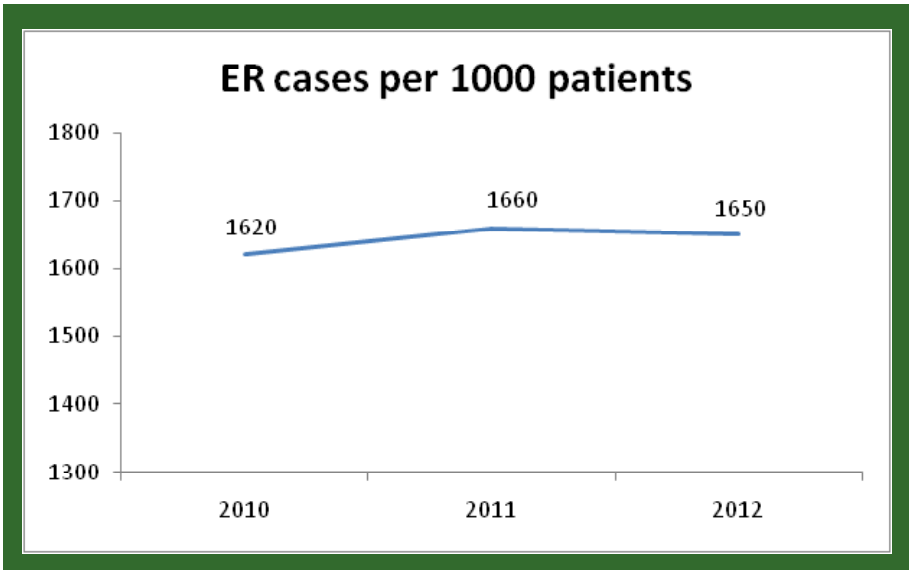
a) investigate the statistics and charges of ER visits in North Texas during past 3 years (2010-2012);

b) present the statistical, demographic and charge details of ER visitors (adults and pediatric) in North Texas counties in 2012;

c) demonstrate the statistical, demographic and charge details of ER usage in Dallas county during past 3 years (2010-2012);

d) use the frequent flyer analysis of two of the highest ER usage counties, including analysis based on zip codes, "hot blocks" and the most "frequent flyer patients."

Figure 1. ER cases per 1000 patients in North Texas in 2010-2012



Key findings for North Texas in 2010-2012:

- No significant (*P*=0.086) change was observed in ER usage per-1000 patients who visited outpatient ER during 2010-2012 in North Texas (Figure 1).

- North Texas emergency departments (EDs) served 18% more patients (combined Medicaid and the uninsured) as compared to the nationally set target for safety net ED facilities (40%). Dallas County served 67% combined Medicaid (29%) and uninsured (38%) patients during 2010-2012, indicating 27% more patients than the safety net ED target.

- Significantly more ER visits (*P* = 0.046) were made by females as compare to males.

- Based on New York University (NYU) severity algorithm analysis, case counts showed stable statistics with an average of 30% emergent visits each year in the region.

- Uninsured (33%) and insured (32%) patients covered a major portion of the payer group followed by Medicaid (25%) and Medicare (10%).

- In the region, overall payer structure has been consistent in 2010-2013, with 43% of the charges spent on emergent visits.

- Total charge for ER usage increased from $ 5,403,037,974 in 2010 to $ 6,911,427,074 in 2012.

ER visits in North Texas counties for 2012 indicated:

- More ER visits were made by females (56-58%) as compared to males.

- Except Dallas and Tarrant counties, all other counties had the highest number of ER visits by insured payers (36% -45%) followed by 25%-30% visits by un-insured visitors.

- NYU analysis indicated 30%-32% emergent ER cases in all these counties in 2012.

- County statistics of 2012 indicated that Johnson County had highest ER cases per 1000 patients in North Texas.

- The average age of ER visitors in 2010 was 44 years for adults and 7 years for children.

ER usage in Dallas County in 2010-2012 showed:

- Dallas county's ER visit per-1000 patients had not changed significantly (*P*= 0.087) during 2010-2012.

- NYU case counts indicated stable statistics between 2010 to 2012, with an average of 32% emergent visits. The highest number of ER visits were made by the un-insured (38%), followed by Medicaid patients (29%).

- ER visits related to mental health, alcohol and substance abuse increased significantly (*P* =0.026) from 19,730 in 2010 to 30,107 in 2012.

Frequent Flyer Analysis of the two highest ER usage counties (Dallas and Tarrant) including analysis based on zip codes, "hot blocks" and most "frequent flyer patients."

Dallas County:

- Higher ER visit zip codes 75216, 75217 and 75243 were selected for the Frequent Flyer Analysis. These zip codes had nearly double the ER cases per 1000 patients (3200) than the Dallas county average.

- More ER visits were made by females than males in all high ER zip codes (59%-64%).

- Zip codes 75216 and 75217 had a diabetes prevalence (15% and 14.1%) higher than the national average (8.3%).

- Payer information indicated these zip codes have highest number of uninsured ER visitors (40% -48%) followed by Medicaid (33%-38%).
- Based on NYU analysis, only 30-33% ER visits in these zip codes were emergent.
- Hot blocks with high ER users had an average age of 34-39 years in adults and 4-7 in children.
- Percentages of pediatric ER visitors in hot blocks ranged from 21% to 57%.
- More ER visits were made by patients of African-American and "not Hispanic/Latino" ethnicity in these hot blocks.
- The number of ER visits by Frequent Flyer Patients ranged 17-62 visits in 2012.
- Pain (chest, headache and abdominal) and bronchitis were the most common diagnosis of Frequent Flyer ER visits.

Tarrant County:

- The higher ER visit zip codes 76119 and 76112 were selected for Frequent Flyer Analysis. These zip codes had nearly double the ER cases per 1000 patients (3450) than the Tarrant county average.
- More ER visits were made by females compared to males in high ER zip codes (65%-66%).
- Both zip codes had diabetes prevalence (11% and 10.2%) higher than the national average (8.3%).
- Payer information indicated that zip code 76119 had 35% uninsured and 39% Medicaid patients, while zip code 76112 had 36% uninsured and 35% Medicaid patients.
- Based on NYU analysis, 33-35% ER visits in these zip codes were emergent, 12-13% visits were non-emergent and 22-23% visits were indeterminate.
- Hot blocks with high ER users had an average age of 31-40 years in adults and 3-7 in children.
- Percentages of pediatric ER visitors in hot blocks ranged from 16% to 58%.
- More ER visits were made by patients of African-American and "not Hispanic/Latino" ethnicity in these hot blocks.
- The number of ER visits by Frequent Flyer Patients ranged 29-69 visits in 2012.
- Pain (chest, headache and abdominal), bronchitis and diabetes were the most common diagnosis of Frequent Flyer ER visits.

Introduction

One in every five Americans has at least one visit to the Emergency Room (ER) per year[1]. ER plays a key role in the delivery of healthcare services to all persons regardless of insurance or ability to pay for medical needs[2]. Emergency department care is a sensitive subject based on a combination of factors such as urgency and overcrowding[3]. ER overcrowding is where the ER's function is impeded when the number of patients exceeds the physical and/or staffing capacity of the ER[4].

ER overcrowding is a common scenario across the globe[3-5] and resources like staff, space and equipment are limited. Patients often have to wait for a long time before being seen by a doctor and even longer before being transferred to the hospital[5]. The result is inconvenience and a degradation of the entire care experience. Quality of care is compromised, the patient's safety may be endangered, staff morale is impaired and the cost of care increases.

The inappropriate use of ER services is one of the common problems leading to overcrowding[6]. Socio-economic, demographic, cultural and environmental disparities have been reported as determinant of non-urgent ER use[6-9].

Rising healthcare charges and associated system cost control have been at the forefront of recent economic, political and medical discussion[10]. Although many people depend on the ER, obtaining acute medical care is increasingly becoming a significant financial burden as total charges for ER services continue to rise[11]. To consumers with insurance coverage, these growing charges result in larger deductibles and co-payments as payers shift toward increased cost sharing[12]. To the growing uninsured who rely on the ER, elevated charges directly result in higher proportions of self-pay responsibility[13, 14].

Regardless of insurance status, increasing charges are growing difficult to manage as aggregate out-of-pocket payments for healthcare have been projected to continue their growth and double from 3.0% to 6.0% per year between 2010–2019[15]. Financial concerns have been cited as the number one reason individuals with non-urgent medical issues delay treatment until an urgent/emergent condition develops[16].

The culture of North Texas has become more diversified as it has grown over the last few decades. A 2010 report published by DFW International stated 44% of area residents were

"new Americans" (foreign-born). Over one million new Americans moved to the area over the past 10 years. In addition, more than 40% of the population did not learn English as their first language, with a total 239 languages are spoken in the region[17].

Lack of an integrated healthcare database has been recognized as a major barrier in future healthcare planning for expected patient numbers, patient charges, workforce hiring, quality and safety, cost estimation, community efforts and public health research.

The Dallas-Fort Worth Hospital Council Foundation (DFWHC Foundation) has a comprehensive patient data registry capable of providing information regarding ER usage, patient charges and underlying disparities in North Texas. To our knowledge, no attempts have been made to investigate ER usage at a regional, county and zip code level in North Texas. The Geographic Information System (GIS) mapping and analysis tool has been very efficient in research when identifying disparities and critically examining the issues, strengths and challenges in the community and hospital-based healthcare[18].

Recognizing the need to identify the disparities in ER overcrowding and the underlying disparities in North Texas, we explored the potential of GIS methodology to analyze data from a zip code-level to high ER-visit "blocks" to frequent flyer patients.

This research aims to provide comprehensive information including statistics, demographics and the charges of ER visits in North Texas. We will also determine the associated charges in different counties, high ER-visit zip codes, high ER-visit "hot blocks" and frequent flyer patients.

Objectives of this research is to:

1. Investigate the statistics and charges of ER visits in North Texas during the past 3 years (2010-2012)

2. Present the statistical, demographic and charge details of ER visitors (adults and pediatric) in North Texas counties

3. Demonstrate the statistics, demographic and charges of ER visits in Dallas county during past 3 years (2010-2012)

4. "Frequent Flyer Analysis" of the two highest ER-visit counties including an analysis based on zip codes, "hot blocks" and most "frequent flyer patients."

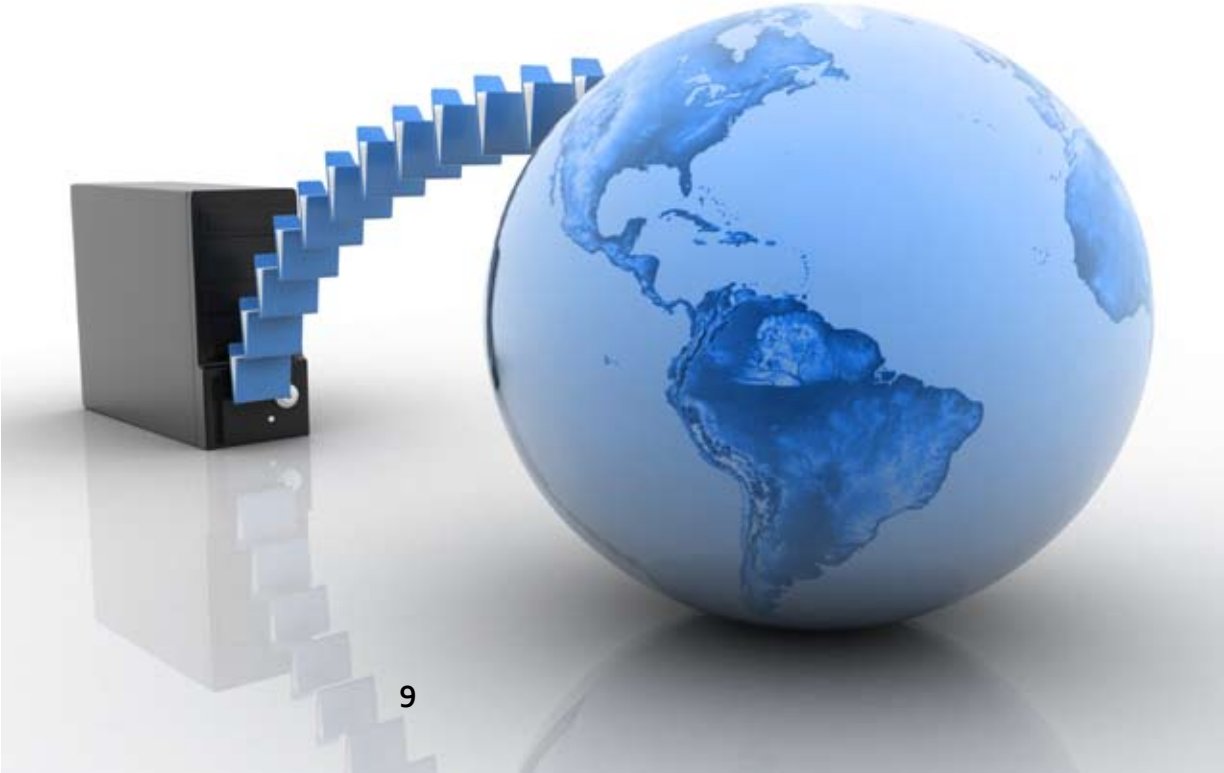
Methods

In 1999, North Texas hospital systems created a combined data warehouse accessible to hospital participants. The DFWHC Foundation securely houses the information of 8 million regional patients and their 28 million hospital encounters in its claims data warehouse. This warehouse collects claims data from 95% of the hospitals in North Texas. The claims record reveals patient's demographic data, payer type, up to 25 diagnosis codes, procedure codes, charges, CPT codes, severity of disease and other information available in the claim data warehouse.

With the Regional Enterprise Master Patient Index (REMPI), the DFWHC Foundation assigns a unique ID to all patients, allowing researchers to track any patient over time by hospital and payer. For the study, ER data for all "out patients" who visited ER during 2010-2012 were extracted from the data warehouse. A validated New York University Emergency Department (NYU) visit severity algorithm was used to classify visits to the ER based on diagnosis.

In this study, the DFWHC Foundation used the Arc GIS mapping system (ArcInfo version 10.0, ESRI, Redlands, CA) to combine ER visits with their corresponding zip codes. Zip code information from Zip Atlas (2012) was used for the analysis. Zip codes with highest ER frequencies were selected for further "hot block" analysis. The "hot block" analysis allowed us to identify areas in selected zip codes representing the highest ER visits. The combination of our data and GIS analysis pinpointed individual frequent flyer patients.

This analysis not only facilitated access to frequent flyers, but helped identify characteristics of the highest ER-use patients and the disparities associated with their frequent ER visits. This research was approved by North Texas Health Information and Quality Collaborative (NTHIQC), which determines the research quality and the patient/hospital confidentiality of all projects at the DFWHC Foundation.



Results

Objective 1:
Statistics and charges of emergency room visits in North Texas during 2010 to 2012

In North Texas, emergency room visits per 1,000 patients has been stable (1,620-1,660 visits per patient) during 2010-2012 (**Figure 1**). Significantly (P = 0.046) more ER visits were made by females as compared to males. NYU case counts indicated stable statistics with an average of 30% emergent visits each year (**Table 1**).

ER visits related to mental health, alcohol and substance abuse increased from 56,624 in 2010 to 72,392 in 2012. This increase from 0.02% to 0.03% between 2010-201 in total NYU case counts was not significant (**Figure 2**).Uninsured (33%) and insured (32%) patients covered a major portion of the payer group followed by Medicaid (25%) and Medicare (10%).

In North Texas during 2010-2012, the combined Medicaid and uninsured patient population was 58%, which is 18% more (combined Medicaid and uninsured patient population) as compared to the nationally set target for safety net ED facilities. Overall, payer structure has been consistent during 2010 to 2013 (**Figure 3**).

In 2010-2013, 43% of the total charges were spent on the emergent visits (**Figure 4**).

Table 1: Statistics, diabetes prevalence, NYU case counts and total charges of ER cases in North Texas in 2010-2012

ER Patients in North Texas		2010	2011	2012
Number of Patients*		1,240,553	1,326,211	1,402,052
ER cases**		2,009,755	2,204,780	2,316,305
Gender (% Females)		55.68%	56.38%	57.49%
Diabetes Prevalence in ER visitors (number of cases with Diabetes and Percent Prevalence)		151,556 (8.19%)	173,867 (7.63%)	187,901(7.46%)
Dialysis/end stage kidney complications		24,296	28,693	33,279
NYU Case Counts	Emergent	630,759	680,392	724,861
	Indeterminate	418,193	464,627	485,108
	Injury	436,816	469,059	473,246
	Non-emergent	213,742	241,231	258,625
	Mental Health	42,266	47,366	54,309
	Alcohol	10,374	11,577	12,264
	Substance Abuse	3,984	4,972	5,819
	Unclassified	253,621	285,556	302,073
Charges	Total Charge	5,403,037,974	6,293,336,132	6,911,427,074

*number of out patient emergency room patients during 2010-2012

** number of ER visits made by these unique patients during 2010-2012

Figure 2: Mental health, alcohol and substance abuse related ER cases in North Texas in 2010-2012

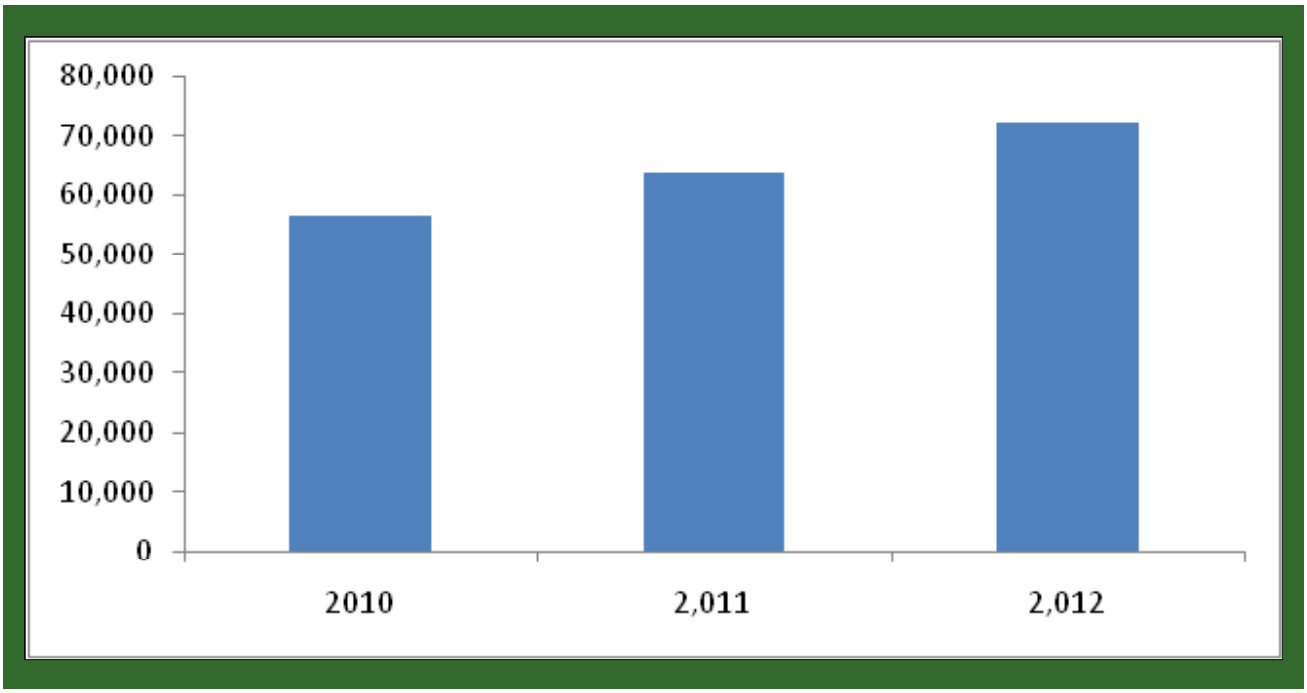


Figure 3: Payer information of ER cases in North Texas in 2010-2012

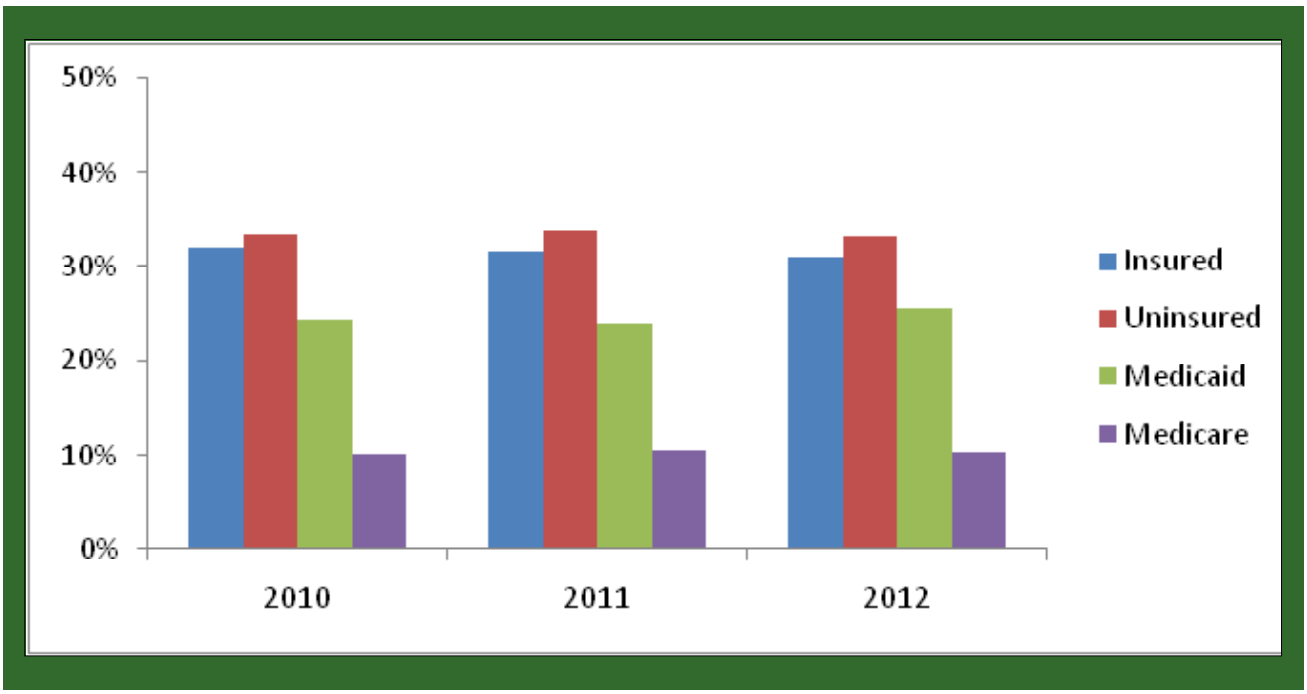
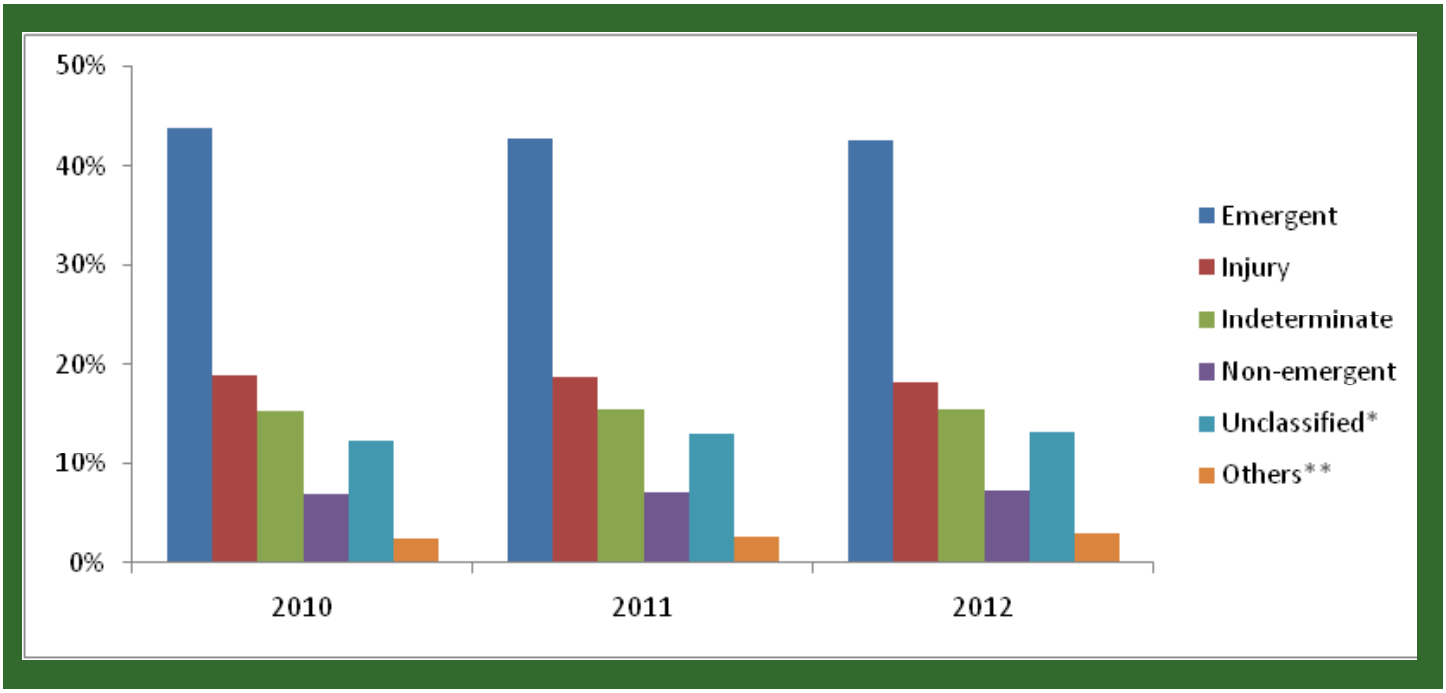


Figure 4: Charges of ER cases based on NYU categories in North Texas in 2010-2012



***include unclassified cases based on the NYU categorization**
****include mental health, substance abuse and alcohol related ER cases**

Results

Objective 2:
Statistical, demographic and charges of emergency room cases (adults and pediatric) in North Texas counties in 2012

County-wide statistics of 2012 indicated that Johnson County had the highest ER cases per 1000 patients (1860) in North Texas (**Table 2**).

Dallas County had highest percentage of diabetes prevalence and dialysis/end-stage kidney complications among ER visitors in North Texas.

Average age of ER visitors for all counties in 2010 was 44 years for adults and 7 years for children. More females visited the ER in all counties compared to males. ER visitor race and ethnicity varied per demography of the county. Noticeably, Dallas and Ellis counties had the highest number of ER visitors in the race category "Others," which included races not listed in our classification, not reported by hospitals or patients of mixed races.

NYU analysis indicated that 30-32% emergent ER cases in all these counties in 2012.

Average charge per ER visit was highest for Collin County (3,769) followed by Denton County (3,746).

Payer structure data of different counties in 2012 indicated that with the exception of Dallas and Tarrant counties, all other counties had the highest number (36% -45%) of ER visits by insured payers followed by 25%-30% visits by un-insured visitors (**Figure 5**). In Dallas County, the highest number of ER visits were made by un-insured visitors (38%), followed by Medicaid (29%) patients. Only 22% ER visitors were insured and 10% were Medicare. Tarrant County had 32% insured and 31% uninsured ER visitors followed by 27% Medicaid and 9% Medicare patients.

Figure 5: Payer information of ER cases in North Texas counties in 2012

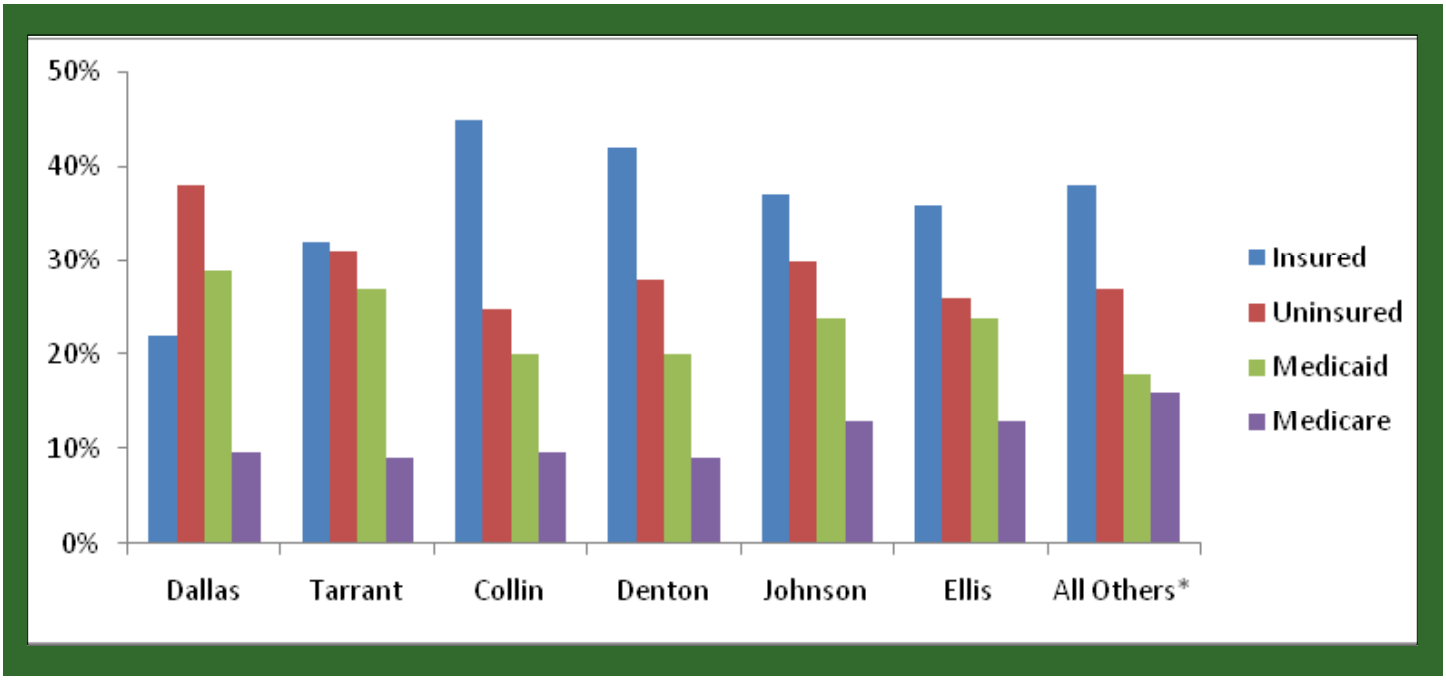


Table 2: Statistics, demographics, diabetes and kidney complications prevalence,charges and payer information for ER visits in North Texas counties in 2012*

ER Patients by Counties		Dallas	Tarrant	Collin	Denton	Johnson	Ellis	All Others*
Number of Patients**		544,187	386,786	123,737	101,207	45,560	32,547	168,028
ER cases***		912,302	665,347	184,934	157,806	84,758	50,573	260,585
ER cases per 1000 patients		1670	1720	1491	1558	1860	1553	1552
%Diabetes Prevalence in ER visitors (number of cases with Diabetes)		9.1% (81,402)	8.1% (54,021)	6.0% (11,139)	6.2% (9,735)	7.9% (6,746)	8.3% (4,192)	7.9% (20,666)
Dialysis/end stage kidney complications		2.1% (19,003)	1.2% (7,924)	0.8% (1,421)	0.7% (1,054)	0.8% (714)	1.1% (569)	1% (2,594)
Gender (% Females)		56.67%	58.91%	57.04%	57.62%	57.85%	56.77%	57.4%
Adult vs Pediatric	Average Age	42 / 6	43 / 7	44 / 7	43 / 7	45 / 7	45 / 7	46 / 7
	Cases	653,891 / 258,411	483,635 / 181,712	127,351 / 57,583	110,992 / 46,814	60,440 / 24,318	35,444 / 15,129	199,477 / 61,158
Race	Black	262,547	156,260	28,536	19,656	2,869	3,499	26,808
	Other	326,487	152,588	49,264	34,649	6,616	35,212	41,331
	White	308,882	346,949	100,673	99,804	74,850	11,786	189,113
	Asian or Pacific Islander	10,155	7,801	5,350	3,112	327	<50	836
	American							
	Not Hispanic or Latino	632,427	531,793	160,523	130,879	79,716	41,563	197,797
	Unknown	309	435	84	<50	<50	71	118
NYU	Emergent	282,107	210,784	56,079	49,401	26,250	16,004	84,135
	Indeterminate	209,267	135,095	34,912	29,372	17,413	10,309	48,929
	Injury	161,359	137,269	44,568	38,501	18,856	11,629	60,816
	Non-emergent	107,392	73,269	19,542	16,682	10,180	5,186	26,478
	Other	152,176	108,930	29,833	23,850	12,058	7,445	40,226
Charges	Total Charge	2,487,677,034	1,920,854,981	697,030,380	591,201,929	235,147,078	136,061,779	843,453,893
	Average Charge	2,727	2,887	3,769	3,746	2,774	2,690	3,237

***Include any emergency room visit outside of these 6 counties including counties outside the state of Texas. Full list of these counties with number of visits can be provided upon request.**

****Number of out-patient emergency room patients in 2012**

***** Number of ER visits made by these unique patients in 2012**

Results

Table 3 describes statistics and demographics of pediatric ER visits. Tarrant County had the highest pediatric ER cases per patient (1.52), followed by Dallas County (1.48). Based on NYU analysis, the majority of pediatric ER visits were indeterminate category visits followed by emergent visits in Dallas (27.23%) and Tarrant (27.1%) counties, and injury-related visits in all other counties.

Table 3: Demographic information of pediatric ER patients in North Texas counties in 2012

Pediatric ER Patients by Counties		Dallas	Tarrant	Collin	Denton	Johnson	Ellis	All Others
Number of Patients*		173,701	119,155	40,507	31,703	14,404	10,313	43,471
ER cases**		258,411	181,712	57,583	46,814	24,318	15,129	61,158
Average Age		6	7	7	7	7	7	7
Race	Black	66,615	43,736	9,647	5,604	900	1,066	5,610
	Other	113,742	27,841	13,667	14,269	2,070	10,528	10,946
	White	73,466	107,009	31,850	25,568	21,179	3,504	43,295
	Asian or Pacific Islander	4,092	2,850	2,130	1,228	149	<50	230
	American Indian / Eskimo / Aleut	491	265	288	143	<50	<50	1,062
	Unknown	<50	<50	<50	<50	0	0	<50
Ethnicity	Hispanic or Latino	117,863	64,196	12,675	13,549	2,456	4,082	14,995
	Not Hispanic or Latino	140,489	117,380	44,895	33,261	21,835	11,031	46,153
	Unknown	59	136	<50	<50	<50	<50	<50
NYU	Emergent	70,373	49,087	14,026	12,112	6,202	3,851	15,490
	Indeterminate	78,281	51,282	14,146	11,616	6,386	4,254	15,814
	Injury	52,905	42,250	16,267	12,519	6,237	4,109	16,801
	Non-emergent	20,694	13,640	4,090	3,413	2,175	1,250	4,680
	Other	36,157	25,453	9,054	7,154	3,318	1,665	8,373
Charges	Total Charge	413,655,673	286,455,598	118,142,779	96,267,599	34,816,167	21,931,145	117,353,500
	Average Charge	1,601	1,576	2,052	2,056	1,432	1,450	1,919

***Number of out-patient ER patients in 2012**
**** Number of ER visits made by these unique patients in 2012**

Results

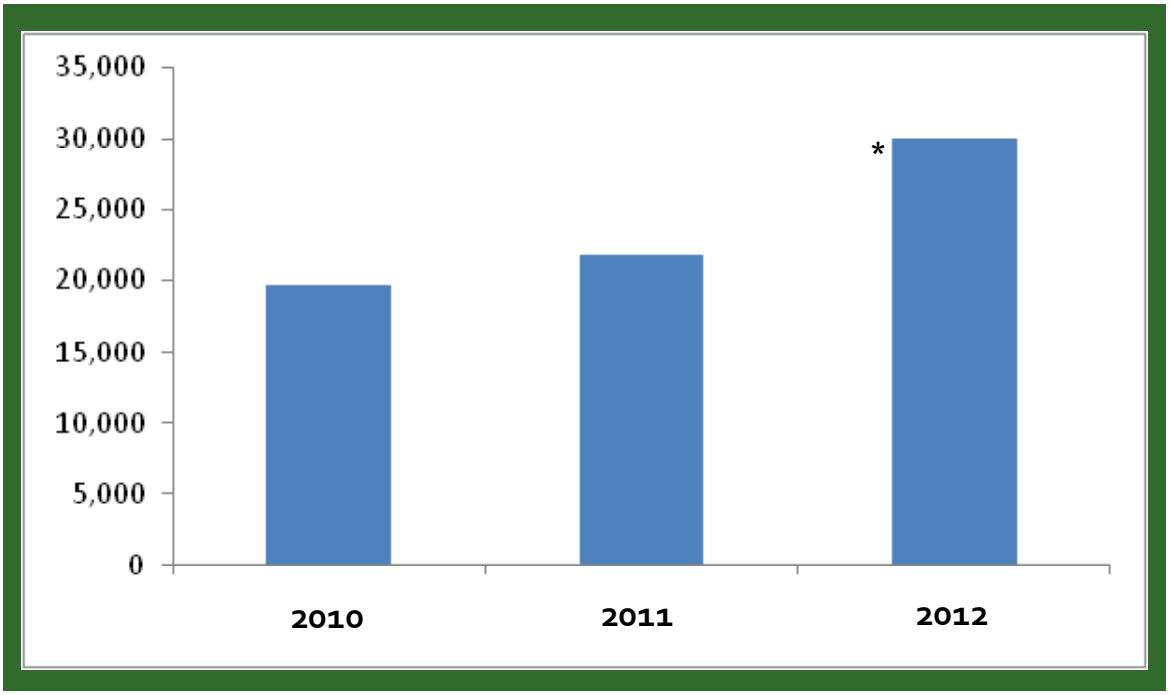
Objective 3:
Statistical, demographic and charges of ER cases (adults and pediatric) in Dallas County during 2010 to 2012

Since Dallas County had the highest number of patients and ER visitors, we investigate the statistics, demography and charges over the past 3 years. ER visits per-1000 patients has been stable with 1590-1671 visits per-patient (*P* = 0.087) during 2010-2012 (**Table 4**).

NYU case counts indicated stable statistics with an average of 32% emergent visits and 68% other visits during 2010 to 2012.

More ER visits were made by females (55%) compared to males. ER visits related to mental health, alcohol and substance abuse increased significantly (P=0.026), from 19,730 in 2010 to 30,107 in 2012 (**Figure 6**). In Dallas County, the highest ER visits were made by un-insured visitors (38-40%) followed by Medicaid patients (29-31%). Only 22-23% ER visitors were insured and 10-11% was Medicare.

Figure 6: Mental health, alcohol and substance abuse related to ER visits in Dallas County over 3 years (2010- 2012)



******P* **= 0.026**

Table 4: Statistics of ER visits in Dallas County in 2010 - 2012

County		Dallas		
ER visits by year		2010	2011	2012
Number of Patients*		461,158	502,141	544,149
ER cases**		732,345	822,495	912,302
ER cases per 1000 patients		1590	1643	1671
Adult vs. Pediatric	Average Age	46 / 7	45 / 7	42 / 6
	Cases	509,299 / 223,046	583,244 / 239,251	652,797 / 259,505
NYU Case Counts	Emergent	232,864	254,315	282,525
	Indeterminate	164,002	189,019	209,606
	Injury	141,721	152,029	161,499
	Non-emergent	78,433	94,134	107,557
	Mental Health	14,018	15,649	22,492
	Alcohol	3,991	4,284	4,907
	Substance Abuse	1,721	1,958	2,708
	Unclassified	95,595	111,107	121,008
NYU Total Charges	Emergent	790,173,448	921,706,128	1,037,967,789
	Indeterminate	306,591,062	365,510,119	418,645,962
	Injury	332,382,054	373,948,038	417,975,953
	Non-emergent	134,656,418	163,737,330	189,266,438
	Mental Health	31,525,799	39,337,306	66,145,958
	Alcohol	13,552,902	15,912,441	19,082,508
	Substance Abuse	4,029,860	5,247,707	7,913,590
	Unclassified	238,125,612	299,647,137	330,678,834
Charges	Total Charge	1,851,037,156	2,185,046,204	2,487,677,034
	Average Case Charge	2,528	2,657	2,727

***Number of out-patient ER patients during 2010- 2012**
**** Number of ER visits made by these unique patients during 2010-2012**

Results

Objective 4:
Frequent Flyer Analysis of the two highest ER-visit counties in 2012 (Dallas and Tarrant) including analysis based on zip codes, hot blocks and most Frequent Flyer Patients.

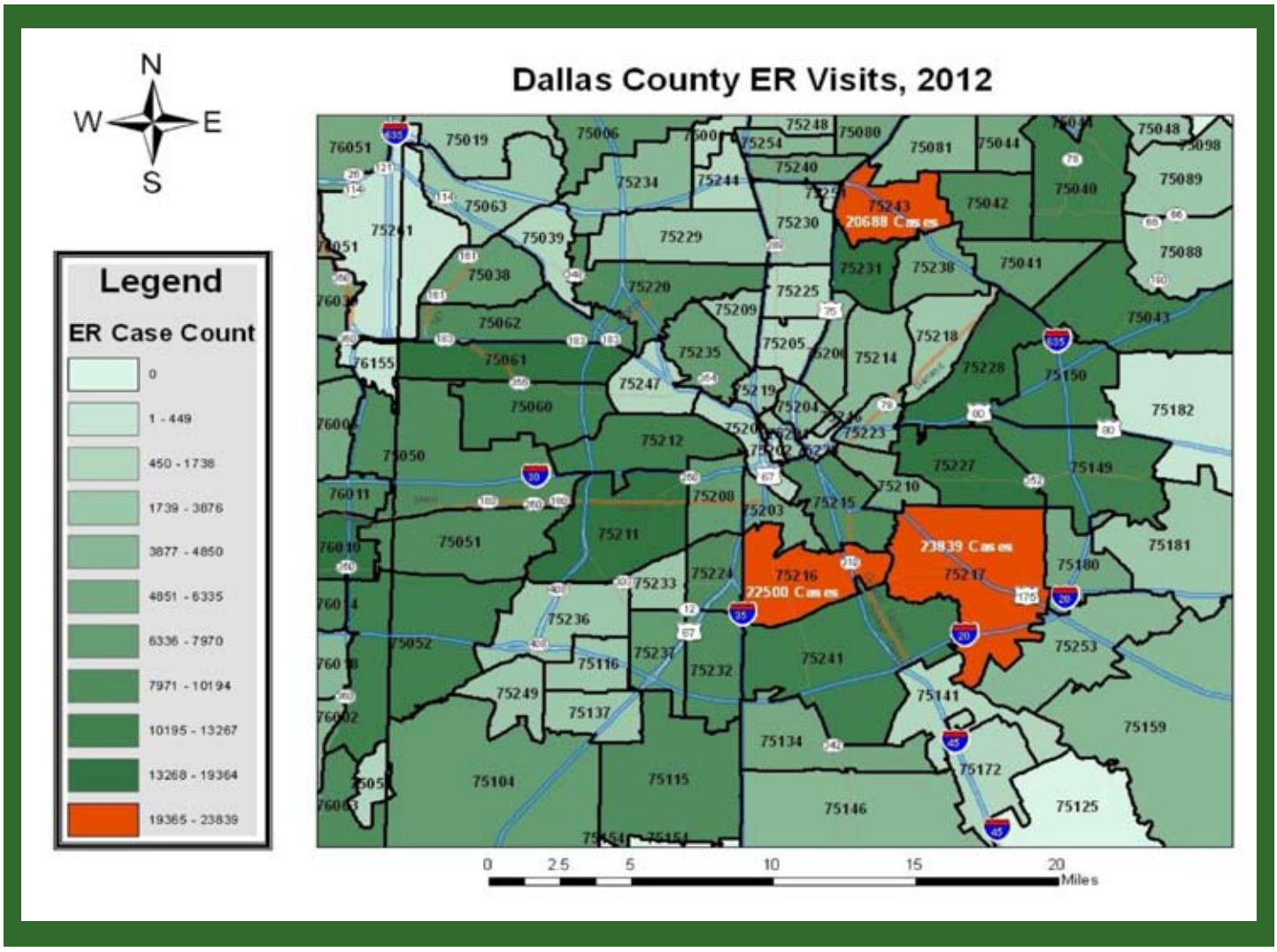
4.1: Dallas County Frequent Flyer Analysis (2012)
High ER-visit zip codes 75216, 75217 and 75243 were selected for the Frequent Flyer Analysis (**Map 1**). All zip codes had nearly double ER cases per-1000 patients (3200) than the Dallas county average of 1600. More females (59.4-64%) made ER visits than males. ER visitors from zip codes 75216 and 75217 also had a higher prevalence of diabetes (15% and 14.1%) than the national average 8.3% (**Table 5**).

When compared with census data for zip code 75216, Caucasians made comparatively more ER visits. In 2012, 1,121 Caucasians lived within this zip code, with 3,220 ER visits (nearly 3 visits per Caucasian resident). African-Americans (population 32,538; ER visits 13,914) made 43% ER visits. Ethnicity-wise, patients with Hispanic/ Latino ethnicity (population 15,207; ER visits 6,061) made 40% ER visits and 60% visits were by patients with non-Hispanic/ Latino ethnicity.

For zip code 75217, census race data indicated that about 28% residents were African-American and 38% were Caucasian. Results showed African-American patients made 62% ER visits, with 27% of the visits from Caucasians. In addition, 65% of the residents in the zip code (75,217) were of Hispanic/Latino ethnicity. Data indicated only 38% of the total ER visits were made by this population, while patients with non-Hispanic and Latino ethnicity made 62% ER visits.

In 2012, zip code 75243 had 41% African-American and 26% Caucasian residents. Residents of Hispanic/ Latino ethnicity numbered 26%. Results indicated African-American patients made more ER visits (57%) than other races in 2012. Patients with non-Hispanic/ Latino ethnicity made more visits (78%) as compare to Hispanic/ Latino residents.

Map 1: Emergency room visits in Dallas County zip codes in 2012



The average age of high ER-visit adults in these zip codes was 40 years, less than the Dallas County average of 42 years. Percent of pediatric ER visitors in these zip codes was 19% in 75216; 25% in 75217; 27% in 75243.

Payer information indicated these zip codes have highest number of uninsured ER visitors (40% in 75216; 48% in 75217; 42% in 75243) followed by Medicaid (33%-38%), 11% insured and 9% Medicare. Based on NYU analysis, 30-33% ER visits in these zip codes were emergent. **Table 5** explains total and average charges ($2,415) for ER visits from these zip codes.

Table 5: Statistics and demographic information of the Frequent Flyer analysis of high ER-visit zip codes in Dallas County in 2012

County		Dallas		
High ER visits Zip codes		75216	75217	75243
Number of Patients*		6,954	7,615	6,423
ER cases*		22,500	23,839	20,688
%Diabetes Prevalence in ER visitors (number of cases with Diabetes)		15% (3027)	14.1% (2943)	8.2% (1591)
Dialysis/end stage kidney complications		1.18% (266)	0.77%(184)	0.42%(87)
Gender (% Females)		59%	62%	64%
Adult vs. Pediatric	Average Age	43 / 5	40 / 5	38 / 5
	Cases	18,212 / 4,288	17,675 / 6,164	15,186 / 5,502
Race	Black	13,914	7,716	11,860
	Other	5,351	9,566	4,782
	White	3,220	6,520	3,564
	Asian or Pacific Islander	<50	<50	341
	American Indian / Eskimo / Aleut	<50	<50	142
Ethnicity	Hispanic or Latino	6,061(40%)	8,937	4,401
	Not Hispanic or Latino	16,439	14,902	16,283
NYU	Emergent	7,316	7,625	6,302
	Indeterminate	5,391	5,960	5,140
	Injury	2,734	2,986	2,673
	Non-emergent	2,810	3,017	3,114
	Other	4,248	4,252	3,459
Payer Information	Insured	138,543	172,753	204,765
	Medicaid	199,963	226,412	268,717
	Medicare	85,234	87,464	89,087
	Uninsured	308,605	335,855	349,733
Charges	Total Charge	53,091,917	59,211,405	49,671,622
	Average Charge	2,360	2,484	2,401

***Number of out-patient ER patients during 2012**
**** Number of ER visits made by these unique patients during 2012**

Results

Hot Blocks Analysis:
This analysis identified the "blocks" within these zip codes with high ER visits using patient addresses. **Map 2** explains the high (red) and moderately high (yellow) ER-visit blocks in zip codes 75216, 75217 and 75243.

Table 6 explains characteristics of high-ER visitors (frequent flyers) living in identified blocks in selected zip codes. Average age varied from 34-39 years in adults and 4-7 in children.

Percentages of pediatric ER visitors in the hot blocks ranged from 21% in "3500 Block E Overton Rd" to 57% "9600 Block Forest Ln." After comparing with census data for these zip codes, hot blocks indicted more ER visits by African-American patients and patients from non-Hispanic or Latino ethnicity. ER visits from these blocks showed 29-36% emergent visits and average charges ranged $1837-$2522 per visit.

Frequent Flyer analysis:
Table 7 shows the detailed information of frequent flyer patients in zip codes 75216, 75217 and 75243. The number of ER visits by these frequent flyers ranged 17-62 visits in 2012. NYU analysis explained the frequencies of emergent and non-emergent visits. Non-emergent visits were as high as 81% and average charges ranged from $1909 to $5103 per visit.

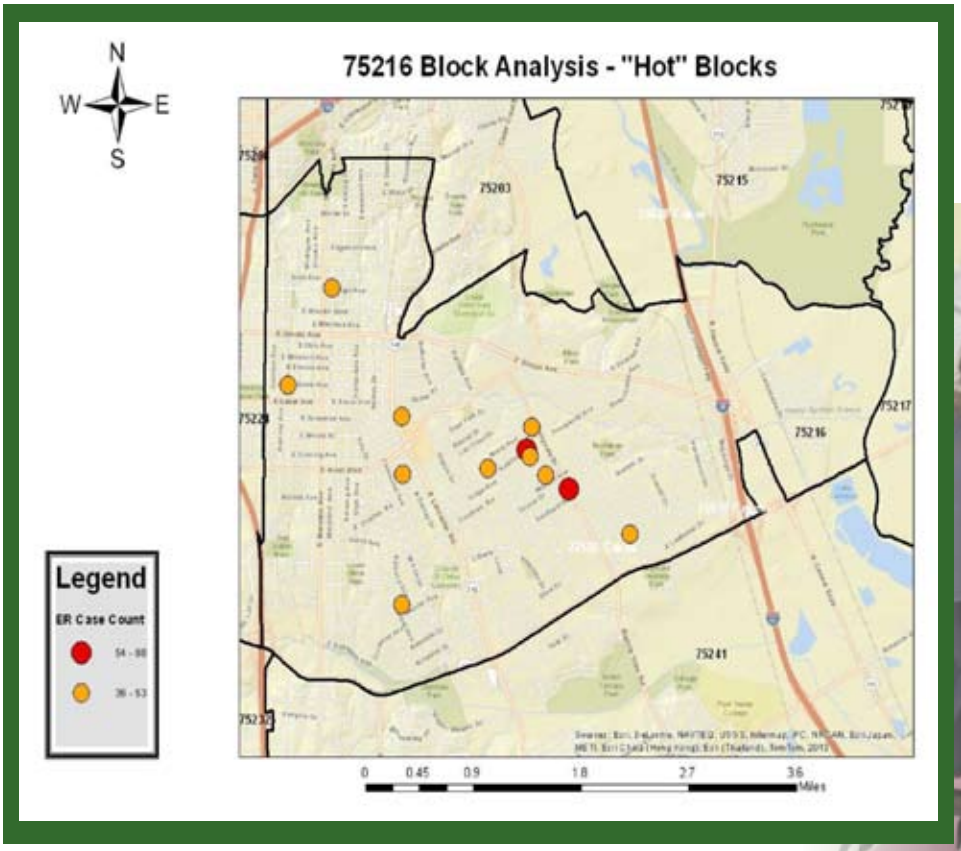
These patients were of the Medicaid, Medicare and uninsured payer group. Pain (chest, headache and abdominal), upper respiratory infections and bronchitis were the most common diagnosis of their ER visits.

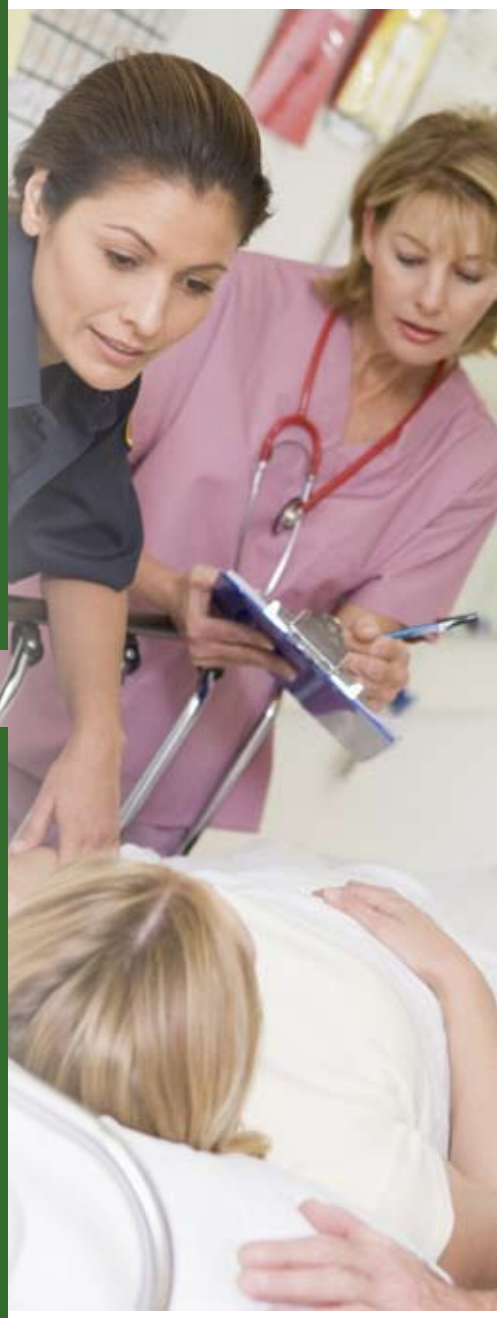
Table 8 explains the top-ten primary diagnoses of frequent flyers from zip codes 75216, 75217 and 75243 during ER visits in 2012.

Table 6: Statistics and demographic information for the Frequent Flyer ER "Hot Blocks" in Dallas County zip codes 75216, 75217 and 75243 (2012)

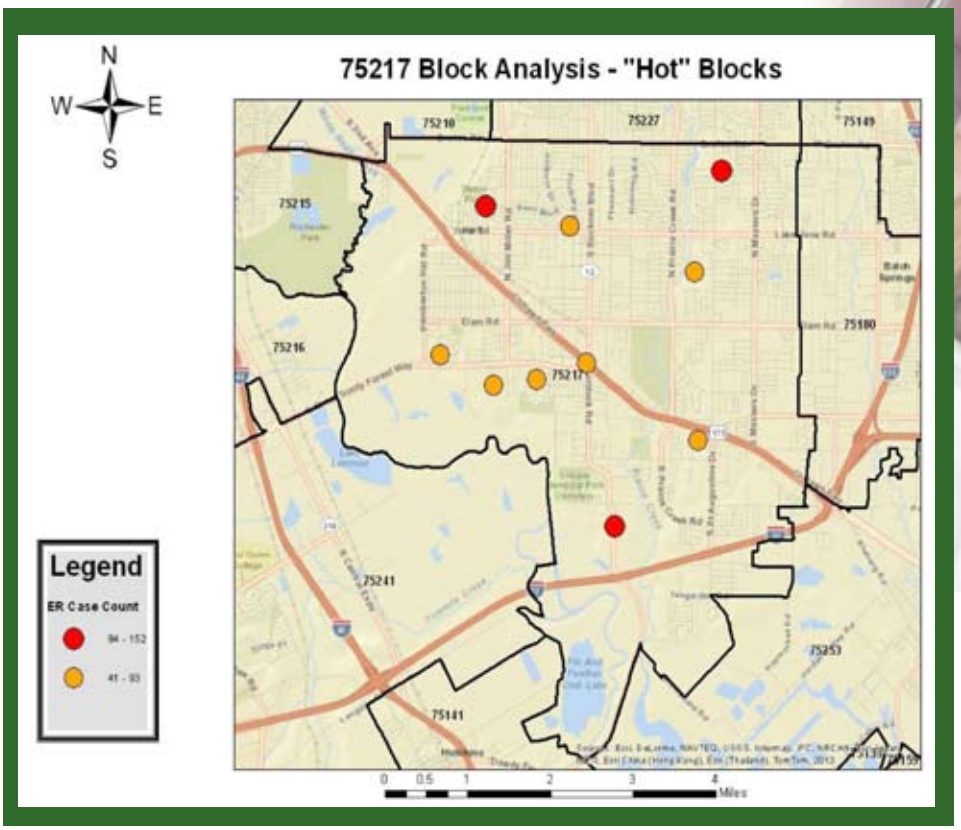
Zip code		75216		75217		75243	
Hot blocks		3500 Block E OVERTON RD	3000 Block E LEDBETTER DR	200 Block STONEPORT DR	100 Block S MARDEAUX LN	9600 Block FOREST LN	9700 Block FOREST LN
ER cases in 2012	Patients	202	158	155	130	484	349
	Cases	525	407	490	399	1312	1088
Adult vs. Pediatric	Average Age	39 / 7	38 / 5	37 / 6	34 / 7	34 / 4	34 / 4
	Cases	431 / 94	329 / 78	399 / 91	303 / 96	834 / 478	798 / 290
Race	Black	332	283	316	243	634	700
	Other	187	116	162	151	382	230
	White	< 50	< 50	< 50	< 50	255	155
Ethnicity	Not Hispanic or Latino	383	338	400	303	947	898
	Hispanic or Latino	142	69	90	96	365	190
NYU	Emergent	162	128	143	144	390	399
	Indeterminate	111	117	118	90	344	261
	Non-emergent	80	54	101	52	193	170
	Injury	69	44	50	48	169	119
	Other	103	64	78	65	216	139
Charges	Total Charge	1,061,538	784,330	1,120,587	892,353	2,938,617	2,744,064
	Avg Charge	2,022	1,927	2,287	2,236	2,240	2,522

Map 2: Hot Blocks analysis in Dallas County zip code 75216





Map 2: Hot Blocks analysis in Dallas County zip code 75217



Map 2: Hot Blocks analysis in Dallas County zip code 75243

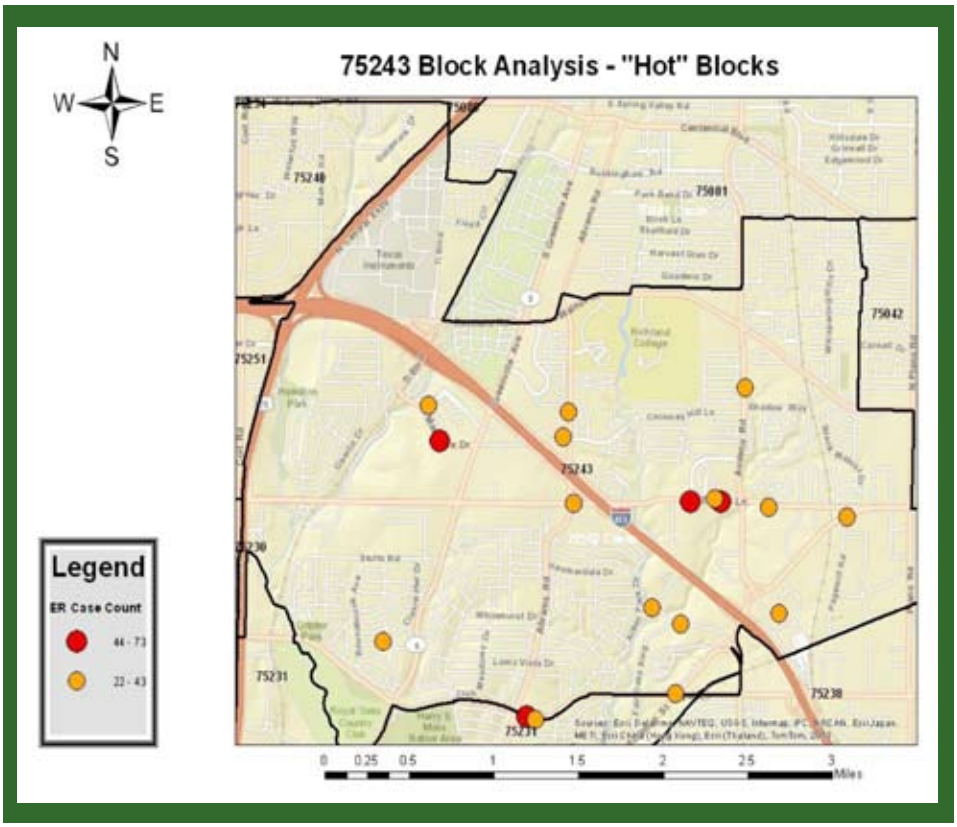


Table 7: Review of high ER visits patients (Frequent Flyer analysis) from zip codes 75216, 75217, 75243 in Dallas County (2012)

Zip code		75216		75217		75243	
Top Patients Review		Patient* 1	Patient2	Patient 1	Patient2	Patient 1	Patient2
ER Visits in 2012		18	17	49	22	62	53
Hospitals** visited/ Number of visits		Hospital 1/ 15 Hospital 2/ 1 Hospital 3/ 2	Hospital 1 / 13 Hospital 2 / 1 Hospital 3/ 1 Hospital 4/ 1 Hospital 5 / 1	Hospital 1/ 29 Hospital 2 16 Hospital 3/ 2 Hospital 4/ 2	Hospital1/ 22	Hospital 1 / 22 Hospital 2/ 22 Hospital 3/ 12 Hospital 4/ 5 Hospital 5/ 1	Hospital 1/ 8 Hospital 2/8 Hospital 3/ 7 Hospital 4/ 7 Hospital 5/ 5
NYU	Emergent	5	12	2	6	41	14
	Indeterminate	3	3	4	5	10	17
	Non-emergent	3	1	40	2	3	8
	Injury	4	0	2	5	4	10
	Other	3	1	1	4	4	4
Total Charge		85,624	21,917	93,524	65,260	316,385	202,065
Avg Charge		4,757	1,289	1,909	2,966	5,103	3,813
Payer Information		Medicare	Medicaid	Medicare	Medicaid	Medicaid	Uninsured

***Patient's identities were fully protected.**
**** Hospital's identities were fully protected.**

Table 8: Top-ten diagnoses in 75216, 75217 and 75243 in 2012

Dallas County					
75216		75217		75243	
Top Ten Diagnosis	Number of Cases	Top Ten Diagnosis	Number of Cases	Top Ten Diagnosis	Number of Cases
Acute upper respiratory infections of unspecified site	628	Acute upper respiratory infections of unspecified site	489	Acute upper respiratory infections of unspecified site	744
Urinary tract infection, site not specified	433	Chest pain, unspecified	379	Abdominal pain, unspecified site	518
Chest pain, unspecified	414	Urinary tract infection, site not specified	337	Fever, unspecified	498
Asthma, unspecified, with (acute) exacerbation	394	Other current maternal conditions classifiable elsewhere, antepartum	326	Headache	466
Unspecified otitis media	370	Asthma, unspecified, with (acute) exacerbation	324	Acute pharyngitis	452
Abdominal pain, unspecified site	352	Headache	322	Unspecified otitis media	450
Headache	351	Chest pain, other	284	Chest pain, unspecified	428
Chest pain, other	294	Abdominal pain, unspecified site	279	Urinary tract infection, site not specified	359
Other current maternal conditions classifiable elsewhere, antepartum	271	Abdominal pain, unspecified site	271	Other current maternal conditions classifiable elsewhere, antepartum	331
Acute pharyngitis	270	Bronchitis, not specified as acute or chronic	233	Bronchitis, not specified as acute or chronic	322

***Patient's identities were fully protected.**
**** Hospital's identities were fully protected.**

Results

4.2: Tarrant County Frequent Flyer Analysis (2012)
Higher ER-visit zip codes 76119 and 76112 were selected for the frequent flyer analysis (**Map 3**). Both zip codes had nearly double the ER cases per-1000 patients (3450) than Tarrant County (1720). More females (65-66%) made ER visits than males. These zip codes also had higher a diabetes prevalence (11% and 10%) than the national average 8.3% (**Table 9**).

Based on 2012 census information for zip code 76119, 50% of the total population was African-American, 31% was Caucasian and 23% was of Hispanic/Latino ethnicity. In 2012, 56% of the ER visits were made by African-Americans followed by 23% for Caucasians. In zip code 76119, 20% of the

Hispanic/Latino population visited ER (i.e. 80% of the ER visits were not by Hispanic/Latino patients).

In zip code 76112, 47% of the total population was African-American, 43% Caucasian and 10% Hispanic/Latino. In 2012, 57% of the ER visits were made by African-Americans, 24% Caucasians and 12% Hispanic/Latino.

The average age of high-ER visitors for adults within these zip codes of 40 years was less than the average age of Tarrant County (43 years; **Table 2**). The percent of pediatric ER visitors in these zip codes was 27% for 76119 and 21% for 76112. Payer information indicated that zip code 76119 had 35% uninsured and 39% Medicaid patients, In zip code 76112, 36% were uninsured and 35% were Medicaid patients. Both of the zip codes had 16-17% insured and nearly 10% Medicare patients.

Based on NYU analysis, 33-35% ER visits in these zip codes were emergent. **Table 9** explains the total and average charges ($2432) for ER visits from these zip codes.

Hot Blocks Analysis:
Analysis identified the "blocks" within these zip codes with high ER visits using the data base. **Map 4** explains the high (red) and moderately high (yellow) ER-visit blocks in zip codes 76119 and 76112 from Tarrant County.

Table 10 explains the characteristics of the high-ER visitors (frequent flyers) living in identified blocks in two selected zip codes. Average age varied from 31-40 years in adults and 3-7 in children. Percentages of pediatric ER visitors in these hot blocks ranged from 16% in "5800 Block Lincoln Meadows Cir "in zip code 76119 to 57% "4800 Block Virgil St" in zip code 76112.

Hot blocks indicted a high number of ER visits by African-American patients, while Hispanic/Latino ethnicity were relatively low after comparisons with the census data. ER visits from these blocks showed 28-40% emergent visits with the average charges ranging from $1871-$2955 per visit.

Frequent Flyer analysis:
Table 11 details the information of frequent flyers in zip codes 76119 and 76112. The number of ER visits by these patients ranged 29-60 visits to 4-5 hospitals in 2012. NYU analysis explains their frequencies of emergent and non-emergent visits.

The average charges ranged $3687-$6057 per visit. These patients were in the Medicaid and Medicare payer group. Pain (chest, headache and abdominal), upper respiratory infection, acute bronchitis and diabetes complications were the most common diagnosis of ER visits.

Table 12 explains the top-ten primary diagnoses of frequent flyers from zip codes 75216, 75217 and 75243.

Map 3: ER visits in Tarrant County zip codes in 2012

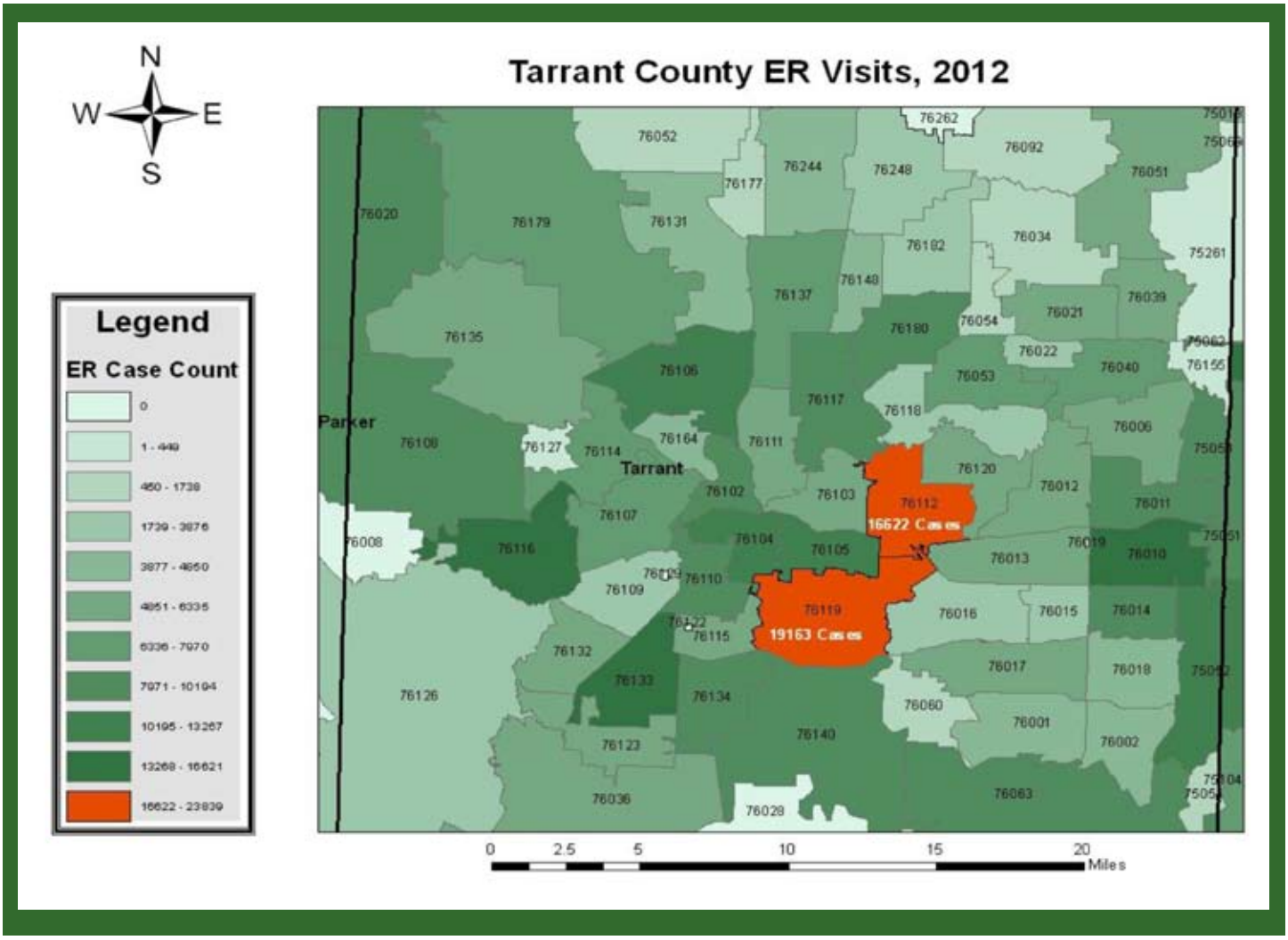


Table 9: Statistics and demographic information of the Frequent Flyer analysis of high ER-visit zip codes in Tarrant County in 2012

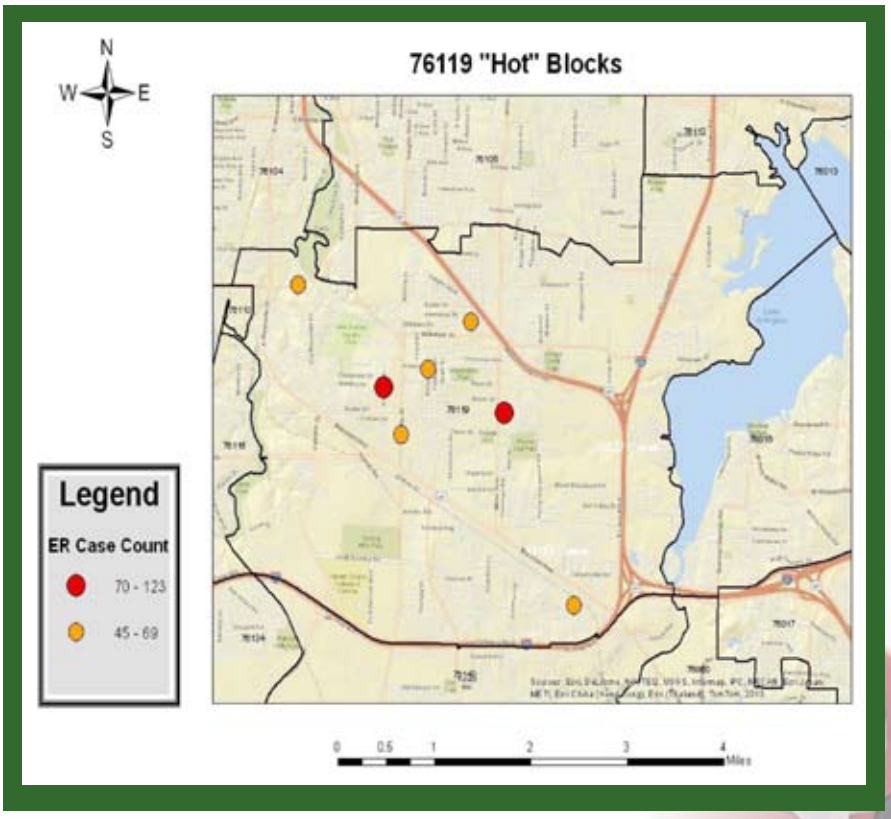
County		Tarrant	
High ER visits Zip codes		Zip code 76119	Zip code 76112
Number of Patients*		5716	4711
ER cases in 2012**		19163	16622
%Diabetes Prevalence in ER visitors (number of cases with Diabetes)		11% (2108)	10.2% (1706)
Dialysis/end stage kidney complications		0.88%(169)	1.06% (117)
Gender (% Females)		64.76%	66.34%
Adult vs. Pediatric	Average Age	41 / 5	39 / 5
	Cases	13,971 / 5,192	13,241 / 3,421
Race	Black	10,597	9,440
	Other	3,919	3,195
	White	4,399	3,928
	Asian or Pacific Islander	213	51
	American Indian / Eskimo / Aleut	35	8
Ethnicity	Hispanic or Latino	3,821	1,962
	Not Hispanic or Latino	15,334	14,656
NYU	Emergent	6,631	5,528
	Indeterminate	4,394	3,644
	Injury	2,614	2,432
	Non-emergent	2,246	2,085
	Other	3,277	2,933
Payer Information	Insured	3014	2841
	Medicaid	7408	5829
	Medicare	1979	1903
	Uninsured	6605	5992
Charges	Total Charge	45,301,906	41,567,840
	Average Charge	2,364	2,501

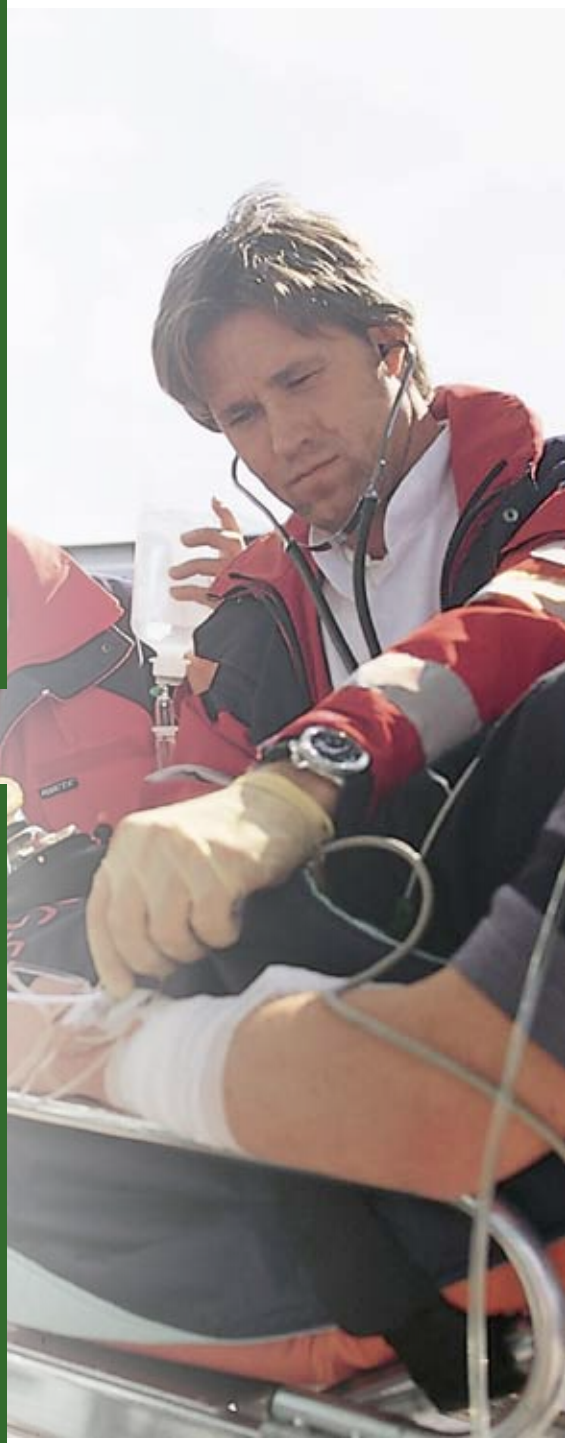
***Number of out-patient emergency room patients during 2012**
**** Number of ER visits made by these unique patients during 2012**

Table 10: Statistics and demographic information for the Frequent Flyer ER Hot Blocks in Tarrant County zip codes 76119 and 76112 (2012)

Zipcode		76119			76112		
Hot blocks		2200 Block E BERRY ST	4800 Block VIRGIL ST	2400 Block WARRIOR CIR	2100 Block HANDLEY DR	1500 Block SANDY LN	5800 Block LINCOLN MEADOWS CIR
ER cases in 2012	Patients	98	91	71	131	90	86
	Cases	320	275	189	417	261	248
Adult vs. Pediatric	Average Age	36 / 5	33/6	32 / 7	40 / 6	36 / 6	31 / 3
	Cases	277 / 43	173/102	116 / 73	319 / 98	218 / 43	213 / 35
Race	Black	153	226	157	317	217	184
	Other	107	< 50	< 50	< 50	< 50	< 50
	White	60	< 50	< 50	60	< 50	< 50
Ethnicity	Not Hispanic or Latino	264	260	165	396	250	235
	Hispanic or Latino	56	< 50	< 50	< 50	< 50	< 50
NYU	Emergent	131	103	59	165	101	89
	Indeterminate	53	76	49	78	46	47
	Non-emergent	44	24	27	38	32	46
	Injury	40	28	27	61	33	30
	Other	52	44	27	75	49	36
Charges	**Total Charge**	**811,082**	**514,585**	**411,482**	**1,093,674**	**771,327**	**548,670**
	Avg Charge	**2,535**	**1,871**	**2,177**	**2,623**	**2,955**	**2,212**

Map 4: Hot Block analysis in Tarrant County zip code 76119





Map 4: Hot Block analysis in Tarrant County zip code 76112

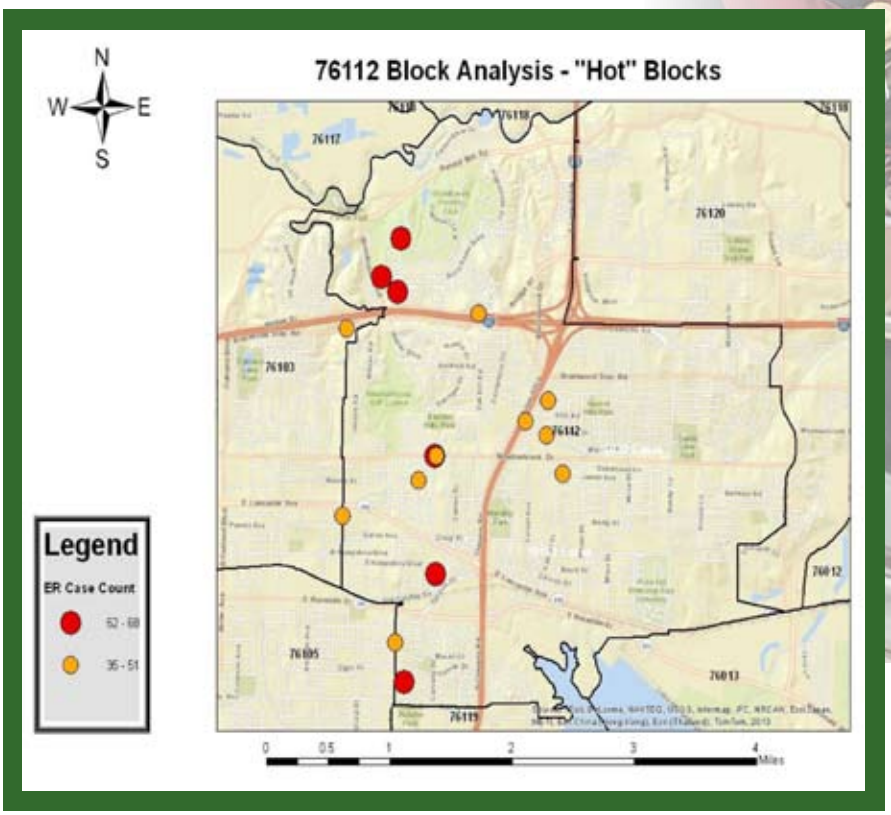


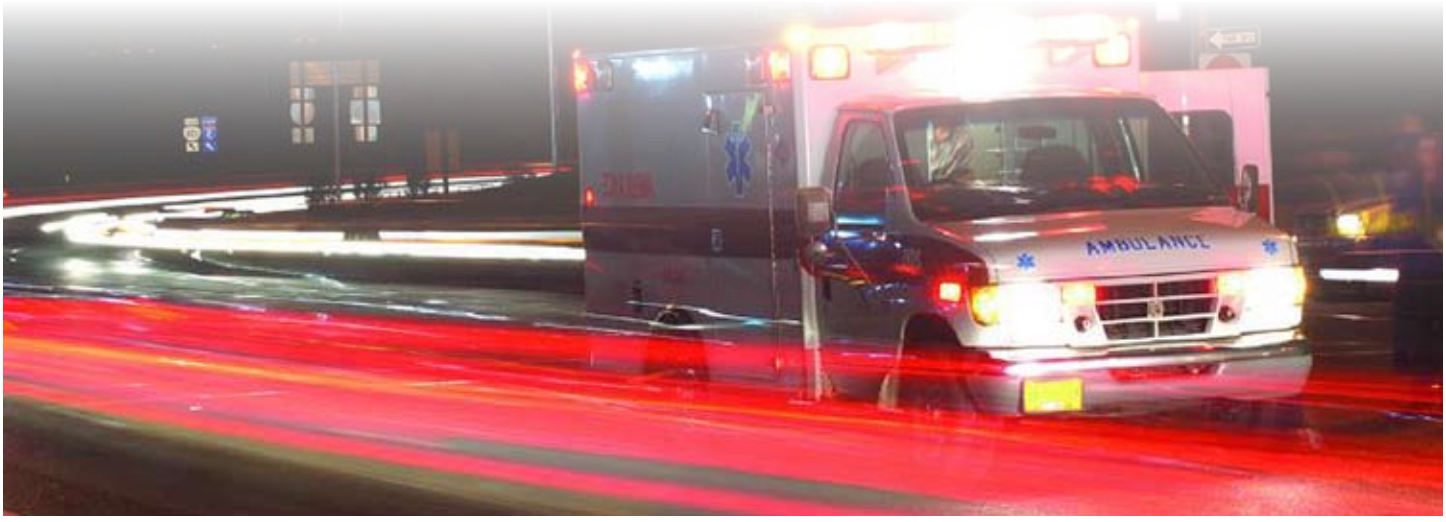
Table 11: Review of high ER visit patients (Frequent Flyer analysis) from zip codes 76119 and 76112 in Tarrant County (2012)

Zip code		76119		76112	
Top Patients Review		Patient* 1	Patient2	Patient 1	Patient2
ER Visits in 2012		60	30	41	29
Hospitals** Visited / Number of Visits		Hospital1/ 24 Hospital 2/23 Hospital 3/7 Hospital 4/ 3 Hospital 5/ 3	Hospital 1/15 Hospital 2/ 8 Hospital 3/ 4 Hospital 4/ 2 Hospital 5/ 1	Hospital1/ 20 Hospital 2/ 17 Hospital 3/ 3 Hospital 4/ 1	Hospital 1/13 Hospital 2/ 8 Hospital 3/ 4 Hospital 4/2 Hospital 5/1
Top 5 Primary Diagnosis Codes		Chest pain, unspecified	Nausea	Type2 diabetes with neurological complications	Chest pain unspecified
		Chest pain, other	Abdominal pain, unspecified site	Syncope and collapse	Chest pain other
		Painful respiration	Abdominal pain, generalized	Chest pain unspecified	Abdominal pain, right upper quadrant
		Unspecified epilepsy	Urinary tract infection	Closed fracture of upper end of fibula	Congestive heart failure
		Bronchitis, not specified as	Abdominal pain	Gastroparesis	Hypertension
		acute or chronic			
NYU	Emergent	49	14	21	25
	Indeterminate	3	12	3	2
	Non-emergent	0	0	3	0
	Injury	2	0	8	0
	Other	6	4	6	2
Total Charge		270,238	110,606	185,110	175,661
Avg Charge		4,504	3,687	4,515	6,057
Payer Information		Medicaid	Medicaid	Medicaid	Medicare

***Patient's identities werefully protected.**
**** Hospital's identities were fully protected.**

Table 12: Top-ten diagnoses in 76119 and 76112 in 2012

Tarrant County			
76119		76112	
Acute upper respiratory infections of unspecified site	628	Acute upper respiratory infections of unspecified site	489
Urinary tract infection, site not specified	433	Chest pain, unspecified	379
Chest pain, unspecified	414	Urinary tract infection, site not specified	337
Asthma, unspecified, with (acute) exacerbation	394	Other current maternal conditions classifiable elsewhere, antepartum	326
Unspecified otitis media	370	Asthma, unspecified, with (acute) exacerbation	324
Abdominal pain, unspecified site	352	Headache	322
Headache	351	Chest pain, other	284
Chest pain, other	294	Abdominal pain, unspecified site	279
Other current maternal conditions classifiable elsewhere, antepartum	271	Abdominal pain, unspecified site	271
Acute pharyngitis	270	Bronchitis, not specified as acute or chronic	233



Discussion

The present study provides a comprehensive analysis of ER usage in North Texas. Results indicated no significant change in ER visits during 2010-2012 (**Figure 1**) while other studies previously reported a steady increase in ER visits in the U.S. since the 1990s[19].

Due to the unique nature of ER services in providing healthcare to everyone regardless of insurance or paying ability, the Institute of Medicine (IOM) and Centers for Disease Control and Prevention (CDC) labeled emergency healthcare services as the "Safety Net." It is the last resort for millions of uninsured patients, Medicaid users and those who lack adequate access to care from community providers[20,21].

According to the Centers for Disease Control and Prevention (CDC), safety-net emergency departments (ERs) are facilities providing more than 30% of the total ER visits to persons with Medicaid, more than 30% of the total ER visits to the uninsured, or a combined Medicaid and uninsured patient population greater than 40% nationally[22, 23].

During 2010-2012 in North Texas, 25% of the ER visits were made by Medicaid patients and 33% by the uninsured (i.e. combined Medicaid and uninsured patient population of 58%). Based on these results, North Texas ERs served 18% more (combined Medicaid and uninsured patient population) patients as compared to the nationally set target for safety net ER facilities by CDC. Dallas County served an average of 67% combined Medicaid (29%) and uninsured (38%) patient population each year during 2010-2012, indicating 27% more patients than the safety net ER target (**Figure 5**). Additionally, North Texas ER facilities provided care to 32% insured and 10% Medicare patients.

Our county-wide distribution of ER visits in 2012 indicated, except for Dallas and Tarrant counties, all other North Texas counties had more ER visits (25-45%) made by insured patients, followed by uninsured and Medicaid patients (**Table 2, Figure 5**). Dallas County had the highest number of ER visits by uninsured patients (38%) followed by Medicaid (29%) and the insured (22%). Tarrant County had an almost equal number of insured (32%) and uninsured (31%) patient visits followed by Medicaid patients (27%).

Tang et al 2011, in a study published in Journal of American Medical Association (JAMA), reported more ER visits by Medicaid patients followed by the uninsured and Medicare patients during 1999-2007. This research was based on the data from National Hospital Ambulatory Medical Care Survey (NHAMCS) and National Center for Health Statistics (NCHS)[2]. We found similar results for Dallas County. All other North Texas counties indicated more ER visits by insured patients, which was an unexpected finding. These results have major significance with ongoing healthcare reforms and the Affordable Care Act. With the expected increase of newly-insured patients, healthcare providers within these counties should to have a future strategy and plan in place. Besides expanding access to, and improving the quality of primary and secondary care, extra efforts should be made to develop the trust between primary care providers and newly-insured patients currently relying on ER services. Regular visits to primary care providers will overcome the problem of individuals with non-urgent medical issues delaying treatment until an urgent/emergent condition develops. Providing equally competent care outside of the ER and changing the perception and behavior of these patients can be challenging, but are the most sustainable approaches towards reducing ER usage by insured payers.

In North Texas, more females than males visited the ER at a county level as well as in high ER-visit zip codes in Dallas and Tarrant counties. These numbers support previously reported gender differences in ER visits by Carret et al 2009[6]. Dallas and Tarrant counties were the highest ER-visit counties in North Texas in 2012. The highest ER frequency zip codes 75216, 75217 and 75243 in Dallas County (**Map 1**), and 76119 and 76112 in Tarrant County, were selected for frequent flyer analysis (**Map 3**). With the exception of zip code 75243, all selected zip codes had a prevalence of diabetes higher than the national average (8.3%), indicating the underlying health disparity related to high ER visits (**Table 5** and **Table 9**).

The uninsured or Medicaid users were the top two payer groups in these zip codes, indicating the economic disparity in most frequent ER-visit zip codes. Based on NYU analysis, only 30-35% of the visits in these zip codes were emergent visits, indicating the lack of access to competent healthcare at a community level. Studies report one of the reasons may be a the patient's behavior related to trusting ER facilities more than local clinics and community healthcare providers. Other factors are timing and cultural reasons [6, 9]. These results highlight the need to develop competent community-based healthcare facilities which are easily accessible so individuals with non-urgent medical issues do not delay treatment until an urgent/emergent condition develops.

GIS mapping coupled with our data allowed us to identify the blocks with frequent ER-visit residents (hot blocks) in the selected zip codes (**Map 2** and **Map 4**). Research revealed that the average age of ER visitors from these hot blocks was 31-40 years. Our results support the findings published by Carret et al 2007 stating inappropriate ER use was higher in younger age groups (15–49 years) compared to the older age groups (50 years or older)[24].

Looking at race and ethnicity distribution in high ER-visit zip codes, with the exception of zip code 75216 in Dallas, African-American patients made more visits to the ER based on census data. In all selected hot blocks from Dallas and Tarrant counties, African-American patients, and not Hispanic/Latino, made more visits compared to other races and ethnicity. These results indicate racial and ethnic disparities in ER visits.

Our data registry allowed us to do spatial analysis to investigate the characteristics of the patients with the most frequent visits (frequent flyers) from these blocks (**Table 7** and **Table 11**). The number of visits by these patients ranged between 17-69 in 2012. The non-emergent visits made by frequent flyers was as high as 81% with an average cost of $2500 per visit. **Table 8** and **Table 12** explains the top-ten common primary diagnosis of their ER visits including pain (chest, headache and abdominal), upper respiratory infection, acute bronchitis and diabetes complications.

Health, socio-economic, gender, age, racial, ethnic, cultural and environmental disparities have previously been reported as a determinant of non-urgent/excessive use of ER[6,7,8,9]. Cultural and linguistic competence is widely recognized as the fundamental aspect of quality healthcare (including mental health), particularly in diverse population regions such as North Texas, home of 44% foreign-born residents, 43% of whom did not learn English as their first language[25, 26]. Cultural and linguistic competence acts are an essential strategy for reducing disparities. This should improve access, utilization and quality of care. Studies have documented the impact of a patient's language deficiency (e.g. limited English proficiency) and racial and ethnic backgrounds as a factor when accessing safe and quality care[27].

Evidences indicate that the sickest 5% of patients account for over half of healthcare costs[28]. Therefore, efforts towards the robust "super-utilizer" programs providing intensive outpatient care management to high-need, high-cost patients (frequent flyers/hot spotters) are starting. In New Jersey, the Camden Coalition of healthcare providers developed the first model for identifying high-utilizers and providing them with highly coordinated care[29]. Our study also indicate an urgent need of targeted efforts in these hot spots and more importantly with these hot spotters, in order to manage their health conditions at non-urgent levels to avoid the development of an urgent/emergent condition and thus, limit the ER visits of these frequent flyers.

Conclusions and Future Implications

This research is the first effort to provide comprehensive and in-depth information regarding ER usage in North Texas. This study provides analysis and evidence regarding ER charges and the underlying disparities at the regional, county, zip code, hot block and patient level.

Providing strength to this research was the DFWHC Foundation's comprehensive data registry. This allowed the performance of spatial analysis with GIS mapping to the patient level to identify the causes associated with frequent visits to the emergency room. These results provide major insight for healthcare and public health decisions.

With the identification of contributing disparities in high ER usage, healthcare resources can be efficiently focused on specific zip codes, blocks as well as patient level promoting the prevention of identified health conditions contributing to high ER usage. These results may guide North Texas hospitals when developing future strategies to improve quality of care as well as prepare for the upcoming challenges with healthcare reforms and the Affordable Care Act.

Acknowledgements

Authors are thankful to the 80 partner hospitals in North Texas for contributing their claims data to the DFWHC Foundation's data warehouse. We are indebted to the members of the DFWHC Foundation board for their support and encouragement. We gratefully acknowledge the contribution of the members of North Texas Health Information and Quality Collaborative (NTHIQC) for approving this study. Authors are thankful to Carol Young and Jaylene Jones for their help with GIS mapping. Thanks also to Chris Wilson for reviewing this publication and to Dr. Crystee Cooper-Walton, Dr. Richard Howe, Sally Williams, Greg Shelton and Nathan Stafford for their wonderful support. The study was supported by DFWHC Research and Education Foundation's internal funding. All authors express no conflict of interest.

References

1. National Center for Health Statistics (2006) Health: United States, 2006, With Chartbook on Trends in the Health of Americans. Hyattsville, MD: NCHS.

2. Tang N, Stein J, Hsia RY, Maselli JH, Gonzales R (2010) Trends and Characteristics of US Emergency Department Visits, 1997–2007. JAMA 304: 664–70. doi:10.1001/jama.2010.1112

3. Moskop JC, Sklar DP, Geiderman JM, Schears RM, Bookman KJ (2009) Emergency department crowding, part 1- concept, causes, and moral consequences.Ann Emerg Med, 53(5):605-11.

4. Australasian College for Emergency Medicine: Policy document -- standard terminology (2002). Emerg Med (Fremantle), 14:337-40.

5. Carrus B, Corbett S, Kandelwai D (2009) A hospital-wide strategy for fixing ED overcrowding. Health International, 9:6-17.

6. Carret ML, Fassa AC, Domingues MR (2009)Inappropriate use of emergency services: a systematic review of prevalence and associated factors.Cad SaudePublica, 25(1):7-28.

7. Ben-Isaac E,Schrager SM, Keefer M, Chen AY (2010) National profile of nonemergent pediatric emergency department visits. Pediatrics 125(3):454-9.

8. Sturm JJ, Hirsh DA, Lee EK, Massey R, Weselman B, Simon HK (2010) Practice characteristics that influence nonurgent pediatric emergency department utilization. AcadPediatr, 10(1):70-4.

9. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P (2010)Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res, 10:66.

10. Robinson JC, Smith MD (2008) Cost-Reducing Innovation In Health Care. Health Affairs (Millwood) 27: 1353–56. doi: 10.1377/hlthaff.27.5.1353

11. Hsia RY, MacIsaac D, Baker L (2008) Decreasing Reimbursements for Outpatient Emergency Department Visits Across Payer Groups From 1996 to 2004. Ann Emerg Med 51: 265–74. doi: 10.1016/j.annemergmed.2007.08.009.

12. Emerman E, Arnoff S (2010) Watson Wyatt Identifies Open Enrollment Benefit Trends for 2010 Watson Wyatt Worldwide. Washington, DC: Warson Wyatt.

13. Wielawski I (2000) Gouging the Medically Uninsured: A Tale of Two Bills. Health Affairs (Millwood) 19: 180–85. doi: 10.1377/hlthaff.19.5.180.

14. Lagnado L (2004) Anatomy of a Hospital Bill; Uninsured Patients Often Face Big Markups on Small Items; 'Rules Are Completely Crazy'. Wall Street Journal. Available:http://online.wsj.com/article/0,SB109571706550822844,00.html. Accessed 2013 Jan 15.

15. Truffer CJ, Keehan S, Smith S, Cylus J, Sisko A, et al. (2010) Health Spending Projections Through 2019: The Recession's Impact Continues. Health Affairs (Millwood) 29: 522–29. doi: 10.1377/hlthaff.2009.1074.

16. Cunningham P, Felland L (2008) Falling Behind: Americans' Access to Medical Care Deteriorates, 2003–2007. Washington, DC: Center for Studying Health System Change.

17. DFW International's 2010 Progress Report…a new exciting image for North Texas! DFW International Community Alliance; www.dfwinternational.org.

18. Mendoza T, Doughty P, Young C, Cooper-Walton C, Sharma S, Tubb L, Jenkins K (2013). Environmental disparities present a challenge for diabetes prevention efforts in Dallas County. Journal of Health disparity and Practice (Under review).

19. Taylor J. (2006) Don't bring me your tired, your poor: the crowded state of America's emergency departments. NHPF Issue Brief. 811(811):1-24.

20. Fields WW, Asplin BR, Larkin GL, et al (2001). The EmergencyMedical Treatment and Labor Act as a federalhealth care safety net program. AcadEmergMed.8(11):1064-69.

21. Institute of Medicine (2006). Hospital-Based EmergencyCare: At the Breaking Point. Washington, DC: NationalAcademies Press :42.

22. Burt CW, Arispe IE (2004). Characteristics of emergencydepartments serving high volumes of safety-net patients:United States, 2000. Vital Health Stat13(155):1-16.

23. U.S. Department of Health and Human Services; Centers for Disease Control and Prevention National Center for Health Statistics. DHHS Publication No. (PHS) 2004-1726. http://www.cdc.gov/nchs/data/series/sr_13/sr13_155.

24. Carret ML, Fassa AG, Kawachi I (2007). Demand for emergency health service: factors associated with inappropriate use. BMC Health Services Research, 7:131 doi:10.1186/1472-6963-7-131.

25. Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care (2002). Unequal Treatment: Confronting Racial and Ethnic Disparities in Care. Washington, DC: The National Academies Press.

26. Sanchez A, Weiss-Armush AM (2003). Study on North Texas immigrant communities. Dallas International Report 2003.

27. Anderson LM, Scrimshaw SC, Fullilove MT, et al (2003). Culturally competent healthcare systems. A systematic review. Am J Prev Med. 24(3 Suppl):68–79.

28. Super-Utilizer Summit: Common themes from innovative complex care management programs. Robert wood Johnson foundation October 2013.

29. The Hot Spotters: Can we lower medical coats by giving the neediest patients better care? Medical Report: The New Yorker January24, 2011.

DFWHC FOUNDATION

www.dfwhcfoundation.org

Principal Investigator and Corresponding Author
Dr. Sushma Sharma
Director Public and Population Health
ssharma@dfwhcfoundation.org