5. Access-Related Outcome Measures

So far, the descriptors of the safety net have been discussed. Details on the composition or structure of the health care providers in the state provided and data that describes the need or demand for services presented. In this section, we will try to link this information to indicators on outcomes and performance of the safety net. This information linkage is essential to understanding more about the relationships of these factors to outcomes and performance and will help policy makers make decisions regarding the allocation of scarce resources.[25]

The indicators used to measure the outcomes and performance of the safety net are limited, especially for vulnerable populations, and presents some challenges when trying to provide uniformity in measurement across the geographic areas of the state. The analysis described in this section will focus on two types of measures: These indicators include:

- Preventable/Avoidable Hospitalizations (Ambulatory Care Sensitive Conditions)

- Births
  - Number of Live Births
  - Not Born in Hospital
  - Inadequate Prenatal Care
  - Teen Mothers
  - Low Birth Weight (Less than 2500 g)
  - Mothers Smoked During Pregnancy
  - Prenatal Care Utilization by the Mothers on Medicaid

Preventable/Avoidable Hospitalizations

The *Preventable/Avoidable Discharges* rate is computed as the number of preventable hospitalization per 10,000 persons in the area, age adjusted 2000 Standard Population. The county level rates are presented in Table 5.1 and Map 5.1. Three counties in Missouri - Pemiscot (513), Ripley (390), and Dunklin (373) - located in the southeastern region, had the highest Preventable Hospitalization rates. Fifty-three of the 115 counties in Missouri had rates greater than the state level.

It should be noted that not all "preventable hospitalizations" are "inappropriate" in the context of being unnecessary or unwarranted. Rather, it simply means that these conditions are generally managed effectively in the ambulatory care setting and that the severity of the condition might have been prevented. It should be acknowledged that not all hospital admissions for preventable hospitalization conditions are preventable or avoidable. Even the best possible medical care cannot prevent progression of some conditions to the stage where hospitalization is required.[26]

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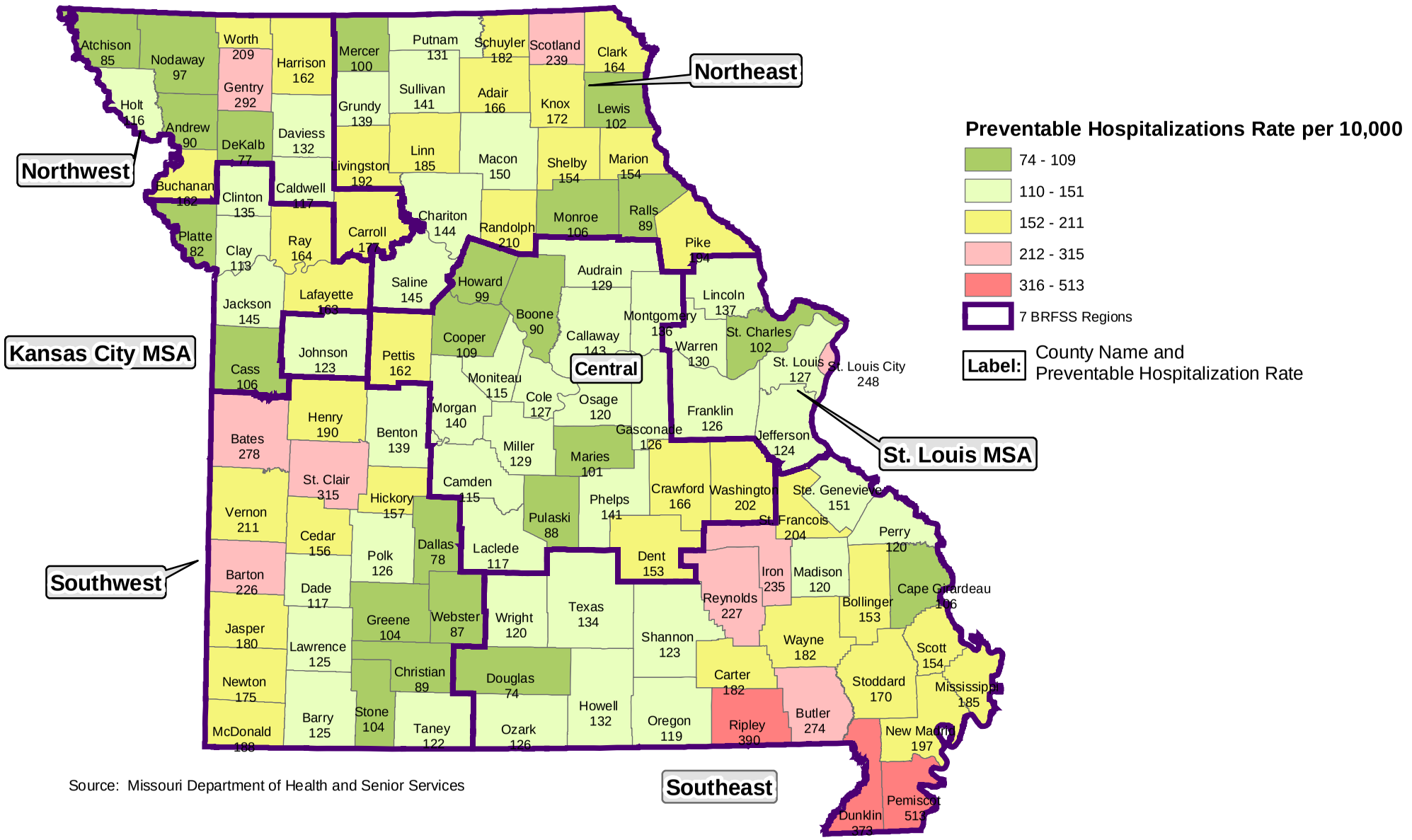
[25] Book I, Chapter 7, Billings and Weinick (2003).
[26] See footnote 24.

Table 5.1: Preventable Hospitalization Statistics in the State of Missouri, 2002								
Region/County	**Number**	**Rate**	**Region/County**	**Number**	**Rate**	**Region/County**	**Number**	**Rate**
Kansas City Metro	**12,989**	**129.7**	**Northeastern Region**	**3,429**	**155.1**	**Southeastern Region**	**9,210**	**190.5**
Cass	824	105.8	Adair	311	165.6	Bollinger	159	153.1
Clay	1,961	113	Chariton	98	144.2	Butler	956	273.6
Clinton	238	134.5	Clark	111	163.6	Cape Girardeau	635	106.3
Jackson	8,536	145.4	Grundy	124	139.1	Carter	94	182
Lafayette	477	162.6	Knox	60	172.2	Douglas	84	73.7
Platte	599	82.3	Lewis	91	102.2	Dunklin	1,079	372.7
Ray	354	164.1	Linn	206	184.5	Howell	428	131.6
St. Louis Metro	**25,623**	**142.1**	Livingston	226	191.6	Iron	217	235.3
Franklin	1,080	125.9	Macon	197	149.7	Madison	122	119.7
Jefferson	2,328	124.3	Marion	370	154.2	Mississippi	231	184.8
Lincoln	510	137.4	Mercer	32	100.1	New Madrid	330	196.7
St. Charles	2,786	102.2	Monroe	88	106.1	Oregon	107	119.1
St. Louis City	11,498	126.8	Pike	309	193.7	Ozark	107	126.1
St. Louis County	7,113	248.1	Putnam	60	130.7	Pemiscot	889	513.4
Warren	308	130.3	Ralls	78	89.1	Perry	187	119.6
Central Region	**7,127**	**130**	Randolph	452	209.8	Reynolds	131	227
Audrain	286	128.8	Saline	277	144.7	Ripley	439	390.2
Boone	1,038	89.8	Schuyler	64	182.2	Scott	551	153.9
Callaway	525	143	Scotland	97	239.4	Shannon	92	123.3
Camden	393	114.9	Shelby	89	154	St. Francois	1,010	203.6
Cole	811	127.4	Sullivan	89	141	Ste. Genevieve	241	151.1
Cooper	155	109.1	**Northwestern Region**	**2,821**	**141.4**	Stoddard	429	169.7
Crawford	339	165.6	Andrew	136	90.1	Texas	299	133.5
Dent	207	153.2	Atchison	47	85.1	Wayne	201	182
Gasconade	167	126.1	Buchanan	1,180	162	Wright	192	120.4
Howard	85	99.3	Caldwell	96	117.2	**Southwestern Region**	**9,938**	**156.8**
Laclede	343	117.3	Carroll	159	177.1	Barry	381	125
Maries	83	101.3	Daviess	95	131.7	Barton	248	226.1
Miller	274	129.3	De Kalb	88	76.9	Bates	414	277.5
Moniteau	148	114.8	Gentry	153	292.2	Benton	229	139.1
Montgomery	143	136.1	Harrison	116	161.8	Cedar	183	156.3
Morgan	239	139.6	Holt	50	115.9	Christian	468	89
Osage	137	119.9	Johnson	506	123.4	Dade	74	116.8
Pettis	551	161.5	Nodaway	157	96.5	Dallas	110	77.8
Phelps	493	140.6	Worth	38	208.5	Greene	2,179	104.4
Pulaski	286	87.8				Henry	368	189.9
Washington	424	202.1				Hickory	112	156.7
						Jasper	1,687	180.4
						Lawrence	400	124.9
						McDonald	371	187.5
Missouri	**71,161**	**142.1**				Newton	831	175.3
						Polk	288	126.1
						St. Clair	258	314.7
						Stone	283	104.1
						Taney	434	121.8
Note: Rate is defined per 10,000						Vernon	366	211.4
Source: Missouri Department of Health and Senior Services						Webster	254	87.2

Map 5.1: Preventable Hospitalization: Rate per 10,000 by Missouri, 2002



Source: Missouri Department of Health and Senior Services

Births

The birth statistics at the state level are presented in Table 5.2. All the indicators are defined per 100 live births. The GIS maps portray county level data and are presented in Appendix 5(a).

Number of Live Births

There were 76,960 live births in Missouri in 2003. Appendix 5(a) provides the number of live births by county.

Not Born in Hospital

In 2003, the number of Missourians not born in hospital was 702 or 0.9 per 100 live births (Table 5.2). County level data portrayed in the GIS map are in Appendix 5(a). This data suggested that the highest number of births (92) not born in hospital were in Webster County followed by Jackson (62). Other prominent counties with higher numbers not born in the hospital were St. Louis County (41), St. Louis City (35), Boone (35), and Greene (30). The rate per 100 live births of Missourians not born in a hospital was again highest for Webster County (19.5) followed by Knox (17.8), and Scotland (13.8).

Inadequate Prenatal Care

Three indicators *Prenatal Care Began First Trimester, No Prenatal Care, and Inadequate Prenatal Care* are included in Table 5.2. In Missouri, less than 1% did not have any prenatal care. For 89%, the prenatal care began in the first trimester. Another measure that best describes health care access is *Inadequate Prenatal Care*. This is defined as fewer than five prenatal visits for pregnancies less than 37 weeks or fewer than eight visits for pregnancies 37 weeks or longer alternatively care beginning after the first four months of pregnancy. In Missouri about 10% of pregnant women had inadequate prenatal care. Data for the Inadequate Prenatal Care indicator is portrayed in the GIS map (Appendix 5(a)). This data suggested the highest number of pregnant women who had inadequate prenatal care were in the two metro regions (St Louis County and St. Louis City) and Jackson County. The rate of inadequate prenatal care per 100 live births was highest in Scotland County (36.5) followed by Pemiscot (28.9), Morgan (29), Knox (28.9), and Reynolds (25.9).

Table 5.2: Birth Statistics for the State of Missouri, 2003			
	Indicator	**Number**	**Rate**
Live Births		**76,960**	**100**
Prenatal Care	Began First Trimester	66,641	88.5
	None	514	0.7
	Inadequate	7,383	10.1
Birth Weight	Very Low (less than 1500 g)	1,245	1.6
	Low (less than 2500 g)	6,194	8
	Normal (2500-4499 g)	69,808	90.7
	High (greater than 4499 g)	932	1.2
Gestation	Low Birth Weight and Full Term	1,843	2.8
	Preterm (less than 37 completed weeks)	10,329	13.4
	Singleton Births Small For Gestational Age	6,360	8.6
Delivery Place	High Risk Deliveries in a Level 2 or 3 Facility	3,162	88.7
Prenatal Service Utilization	Mother on Food Stamps	15,708	21.4
	Mother on Medicaid	33,436	45.4
	Mother on WIC	30,897	42
Method of Delivery:	C-Section	21,320	27.7
	Vaginal Birth After C-Section	1,026	11
Smoked During Pregnancy	Yes	13,895	18.1
	Yes, 1 or More Packs Per Day	2,536	3.3
Unintended Delivery	Includes Live Births and Fetal Deaths	26,603	34.3
Birth Spacing	Less Than 18 Months	4,632	10.8
Education Status	Less Than 12 Years	14,277	18.6
Marital Status	Not Married	27,364	35.6
Number Born	Twin or Other Multiple Birth	2,618	3.4
Prior Live Births	Four or More	3,208	4.2
	Mother Under Age 20	1,630	2.1
Weight Change	Gained Less Than 15 Pounds, Full Term Singleton Birth	5,218	8.3
	Gained More Than 44 Pounds, Full Term Singleton Birth	12,246	19.4
Weight for Height	Mother Overweight 20% or More	27,012	36.9
	Mother Underweight More Than 15%	4,374	6
Birth Place	Not in Hospital	702	0.9
	Very Low Birth Weight Births Delivered in a Level 3 Facility	944	78.3

Sources: Missouri Department of Health and Senior Services, 2003

Teen Mothers

This data is listed under prior births: mothers under age 20. For the state of Missouri, the number of teen mothers was 1,603 or 2.1 per 100 live births (Table 5.2). County level data is portrayed in the GIS map (Appendix 5(a)). This data suggested the highest number of teen mothers was in the two metro regions (St Louis County and St. Louis City) and Jackson County. The rate of births to teen mothers per 100 live births was highest in Pemiscot County (9.1) followed by New Madrid (5.5), Grundy (5.5), and Dent (5.3).

Low Birth Weight (Less than 2500 g)

In 2003, 6,194 or 8% of live births in Missouri had a birth weight of less than 2,500 grams (Table 5.2). The county level data is portrayed in GIS maps (Appendix 5(a)). This data suggested the highest numbers of births with low birth weight were in the two metro regions (St Louis County and St. Louis City) and Jackson County. Twelve counties of Missouri had the highest rate of low birth weight of newborn. The highest rate was in Iron County (16.4) followed by Schuyler (15.6), New Madrid (13.1), Holt (12.3), Pemiscot (11.9), Gentry (11.4), Marion (11.2), and Miller (11.1).

Mothers Smoked During Pregnancy

In Missouri, the number of mothers who smoked during pregnancy was 13,895 or 18.1 per 100 live births (Table 5.2). The county level data is portrayed in GIS maps (Appendix 5(a)). This data suggests the highest number of mothers who smoked during pregnancy were in the two metro regions (St Louis County and St. Louis City) and Jackson and Greene counties. Fourteen counties of Missouri had the highest rate of mothers who smoked during pregnancy. Half of these counties were located in the southeastern region. The highest rate was in Worth County (50).

Prenatal Care Utilization by the Mothers on Medicaid

In 2003, the number of mothers on Medicaid who utilized the prenatal care services was 33,436 or 45.4 per 100 live births in Missouri (Table 5.2). County level data portrayed in GIS maps are in Appendix 5(a). This data suggested the highest number of mothers on Medicaid who utilized the prenatal care services were in the two metro regions (St Louis County, St Louis City, and Jackson County), and Jasper and Greene counties. The highest rate per 100 live births of mothers on Medicaid who utilized the prenatal care services was also in the same areas of Missouri.

Other Vital Statistics

Table 5.2 contains other important vital statistics for Missouri. The Missouri Department of Health and Senior Services maintain this data. According to 2003 data, 89% were born in High Risk Deliveries in a Level 2 or 3 Facility.[27] High Risk Delivery is defined as resident live births weighing less than 2,000 grams and/or with gestational age of less than 34 weeks plus all intrapartum fetal deaths in unspecialized facilities. Rate is percent number of total Missouri resident high-risk deliveries born in Missouri. Twenty-eight percent were caesarian section

[27] Resident live births weighing less than 2,000 grams and/or with gestational age of less than 34 weeks plus all intrapratum fetal deaths in unspecialized facilities. Rate is percent number is of total Missouri resident high-risk deliveries born in Missouri.

births, Twenty-one percent of mothers were on food stamps, and 42% of the mothers were on WIC had used prenatal services.

Relationship of Outcome Measures to Safety Net Performance

"Preventable hospitalizations and birth outcomes are quasi-outcome measures that may be affected by a complex array of factors, including insurance status, care-seeking behavior, and the performance of the health care delivery system. Survey measures such as having a usual source of care may be more sensitive to "front door access" and less influenced by how well these services perform or by the care-seeking behavior of patients."[28]

Based on data for Missouri, four variables inadequate prenatal care, preventable hospitalization, and ER use by uninsured and publicly insured were picked to rank the counties. Table 5.3 shows the individual and composite ranking of top 20% of counties with greater problems to access. Complete ranking is at Appendix 5(b).

Table 5.3: Ranking: Access to Health Care Services
(Counties By Composite and Individual Ranks)

	County Name	ER Use by Uninsured	ER Use by Publicly Insured	Inadequate Prenatal Care	Preventable Hospitalization	Composite (Access)
1	St. Louis	114	115	101	115	445
2	Jasper	111	111	91	108	421
3	Newton	106	105	97	100	408
4	Dunklin	92	96	114	105	407
5	Jackson	115	114	61	114	404
6	Butler	98	98	105	102	403
7	Taney	105	100	109	85	399
8	Pettis	99	92	106	94	391
9	St. Louis City	113	113	49	113	388
10	St. Francois	103	102	66	103	374
11	Greene	112	112	31	110	365
12	Camden	91	90	100	79	360
13	Lawrence	96	97	81	80	354
14	Callaway	89	80	87	93	349
15	Scott	88	101	65	95	349
16	Buchanan	104	107	30	107	348
17	Ripley	67	82	112	86	347
18	Boone	108	106	28	104	346
19	Jefferson	107	109	19	111	346
20	Clay	109	108	18	109	344
21	Barry	93	89	83	78	343
22	St. Charles	110	110	7	112	339
23	Audrain	75	87	110	63	335

Source: Computation of these ranks is based on data from Missouri Department of Health and Senior Services
Note: The higher rank indicates poor access to the health care safety net. This ranking helps with the objective of identifying the counties of Missouri with poor access to primary/preventive health care.

[28] Book I, Chapter 7, Billings and Weinick (2003).

Summary: Relationship of Outcome Measures to Demand, Support, Structure and Context Measures[29]

National studies have shown some very strong associations between many of the outcome measures and some of the individual demand, support, structure, and contextual indicators and are listed below:

- very strong association between preventable hospitalization rates for older adults and area poverty rates
- moderate association observed for preventable hospitalization rates for children
- strong association exist between poverty levels and birth outcomes as well as between race/ethnicity and both potentially preventable hospitalization rates and birth outcomes

National studies, using multivariate analysis for preventable hospitalization and birth outcomes and "personal distress" indicators (poverty, unemployment, disability, high school or less education level, single-parent households, and living alone) and "community distress" indicators (crime rates, housing vacancy rates, age of housing, and home ownership) have produced some surprising results and are shown in Tables 5.3 and 5.4.

[29] Book I, Chapter 7, Billings and Weinick (2003).

Table 5.4. Multivariate Analysis of Community and Safety Net Characteristics on Patient Outcomes and Performance of the Safety Net: Preventable Hospitalizations in Cities, Suburban Counties, and County Residuals[30]

	Preventable/Avoidable (ACS) Hospitalizations		
	Children Ages 0-17	Adults Ages 18-39	Adults Ages 40-64
Characteristics associated with lower rates/ better outcomes	Greater extent of Medicaid coverage More hospital outpatient capacity/use Higher managed care penetration More pediatricians Greater concentration of low-income residents Western U.S. residence	Higher level of disproportionate share hospital (DSH) payments Greater extent of Medicaid coverage More hospital outpatient capacity/use Higher public hospital presence Higher managed care penetration Higher foreign-born population Western U.S. residence Eastern U.S. residence	Higher level of DSH payments Greater extent of Medicaid coverage Higher public hospital presence Higher foreign-born population Greater concentration of low-income residents Western U.S. residence
Characteristics associated with higher rates/worse outcomes	Greater levels of personal distress Higher black population Higher Asian population Higher foreign-born population Higher teaching hospital presence Eastern U.S. residence	Greater levels of personal distress Higher black population Higher Asian population Greater concentration of non-white residents	Greater levels of personal distress Higher black population Higher Asian population Higher Hispanic population Higher teaching hospital presence
Characteristics having no association with outcomes	More community distress Higher level of DSH payments Higher investor-owned hospital presence Higher public hospital presence Higher Hispanic population Greater concentration of non-white residents	More community distress Higher investor-owned hospital presence Higher teaching hospital presence Higher Hispanic population Greater concentration of low-income residents More primary care physicians	More community distress More hospital outpatient capacity/use Higher investor-owned hospital presence Higher managed care penetration Greater concentration of non-white residents Eastern U.S. residence More primary care physicians

Source: Book I, Chapter 7, Billings and Weinick (2003)

[30] Book I, Chapter 7, Billings and Weinick (2003).

Table 5.5: Multivariate Analysis of Community and Safety Net Characteristics on Patient Outcomes and Performance of the Safety Net: Birth Outcomes in Cities, Suburban Counties, and County Residuals[31]

	Birth Indicators		
	Late/No Prenatal Care	Low Birth Weight Full Term	Preterm Births
Characteristics associated with lower rates/ better outcomes	Higher level of disproportionate share hospital (DSH) payments Greater extent of Medicaid coverage Higher managed care penetration Higher foreign-born population	Greater extent of Medicaid coverage Higher managed care penetration Western U.S. residence	Higher level of DSH payments Greater extent of Medicaid coverage More hospital outpatient capacity/use Higher public hospital presence Higher managed care penetration Higher foreign-born population Eastern U.S. residence Western U.S. residence
Characteristics associated with higher rates/worse outcomes	Greater levels of personal distress Higher teaching hospital presence Higher black population Eastern U.S. residence Western U.S. residence Greater concentration of low-income residents	Greater levels of personal distress Higher investor-owned hospital presence Higher teaching hospital presence Higher black population Higher Asian population	Greater levels of personal distress Higher investor-owned hospital presence Higher black population Higher Asian population Higher Hispanic population Greater concentration of non-white residents
Characteristics having no association with outcomes	More community distress More hospital outpatient capacity/use Higher investor-owned hospital presence Higher public hospital presence Higher Asian population Higher Hispanic population Greater concentration of non-white residents More obstetrician/gynecologists	More community distress Higher level of DSH payments More hospital outpatient capacity/use Higher public hospital presence Higher Hispanic population Higher foreign-born population Eastern U.S. residence Greater concentration of low-income residents Greater concentration of non-white residents More obstetrician/gynecologists	More community distress Higher teaching hospital presence Greater concentration of low-income residents More obstetrician/gynecologists

[31] Book I, Chapter 7, Billings and Weinick (2003).

Other interesting results from the multivariate analysis include:

- Areas with higher managed care penetration experienced lower preventable hospitalization rates and better birth outcomes. This may suggest that the competition between managed care organizations may potentially improve safety net performance, due to the organizations being more responsive to patient demands or face a loss of the market share.

- Higher levels of foreign-born populations either were associated with better outcomes or had no association with outcomes. This may be due to better health status of these populations. One exception to this was with larger immigrant populations that have higher children's preventable hospitalization rates, and may be attributed to learning how to navigate the health care system or the care-seeking behavior of foreign-born parents.

Conclusions Drawn by AHRQ Include:[32]

Federal and State Financing of the Safety Net Helps.

Medicaid programs with a greater extent of coverage and higher disproportionate share hospital payments are generally associated with lower preventable hospitalization rates and better birth outcomes.

Public Facilities Matter.

For adults, a greater presence of public hospitals is associated with lower preventable hospitalization rates. A greater public hospital presence is also associated with lower rates of preterm births.

More Providers is Not Always the Answer.

While having more pediatricians is associated with lower preventable hospitalization rates for children, greater availability of adult primary care physicians has no association with preventable hospitalization rates for adults, and having more obstetrician/gynecologists has no impact on birth outcomes.

The relationship between provider supply and preventable hospitalizations may vary by region. See, for example, an analysis of New York State in Basu J, Friedman B, Burstin H. Primary care, HMO enrollment, and hospitalization for ambulatory care sensitive conditions: A new approach. Med Care 2002 Dec; 40(12):1260-9.

Levels of Personal Distress are a Concern.

Across all age groups, higher levels of poverty, unemployment, disability, low education, and social isolation are associated with higher levels of preventable hospitalizations and worse birth outcomes.

[32] Book I, Chapter 7, Billings and Weinick (2003).

Race/Ethnicity is a Factor.

Across all age groups, larger black and Asian populations are associated with higher preventable hospitalization rates and worse birth outcomes. For older adults, larger Hispanic populations are also associated with higher preventable hospitalization rates.

AHRQ noted an unexpected finding related to the impact of levels of community distress (the combined impact of crime rates, housing stock, housing vacancy rates, and home ownership) had no association with preventable hospitalization rates or birth outcomes.

It was also noted in the AHRQ report that the impact of investor-owned hospitals on the viability of local safety nets had no association with preventable hospitalization rates or levels of late/no prenatal care. However, there was an association between a greater investor-owned hospital presence and higher levels of low birth weight and preterm births. This association will require additional analysis in order to better understand the impact these hospitals have on the safety net.