



ASTHMA IN MISSOURI: SPRINGFIELD & GREENE COUNTY

FOCUS ON INNOVATION AND CONTINUOUS IMPROVEMENT

University of Missouri
Department of Child Health
Asthma Ready Communities®

Abstract

Springfield, located in southwestern Missouri, is the third largest city in the state, the county seat of Greene County, and serves as a core for a metropolitan statistical area comprised of five counties: Greene, Christian, Webster, Polk, and Dallas. The prevalence of asthma among children and teens aged 0 to 17 years in the southwest region was almost one-half that of the state (~45%), but many of the students within the Springfield area and school district had persistent and/or uncontrolled asthma and resulted in substantial morbidity and costs.

Springfield Public School district is Missouri's largest fully accredited school district with more than 25,000 students (or about 3% of Missouri's total public-school student population) attending 38 elementary schools, nine middle schools, and five high schools. Children and teens aged 0-17 years accounted for almost 30% of the asthma emergency department (ED) visits and asthma hospitalizations that occurred among individuals living in Greene County (2004-2015). While the asthma ED visit rates among the 0 to 17 age group have remained relatively stable in Missouri, there has been a significant decrease in Greene County comparing 2004 and 2015 (4.76, 95% CI 4.20-5.38 v 3.66, 3.19-4.18). In addition, in Missouri there was a statistically significant annual average decline of 2.5% in asthma hospitalizations among children 0 to 17 years of age 2004-2015 and Greene County also showed a significant decline in asthma hospitalizations among children comparing 2004 to 2015 (13.05, 95% CI 10.19 – 16.46 v 7.63, 5.59-10.18).

Seven Springfield zip codes represented 80% of the asthma ED visits and 78% of the asthma hospitalizations from Greene County. For those aged 0 to 19 the asthma hospital admissions rates by month indicated two peak periods: 1) April and 2) September through October. Also shown was a substantial low plateau in asthma hospital admissions for children and teens for the months of June and July. The health care system in Greene County includes hospitals, clinics, community health centers, public health, mental health services, schools, Medicaid and care management services, and community partners such as churches. There is a plethora of resources also available.

University of Missouri

Department of Child Health

Asthma Ready Communities

Funding for this report was provided in part by the Leda J Sears Trust Fund and the US Centers for Disease Control and Prevention cooperative agreement number N01CE001393. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

Cover photo: SpringfieldMO.org



TABLE OF CONTENTS

Abstract.....	1
Springfield, Missouri	3
Asthma Control	4
Asthma Emergency Department Visits and Hospitalizations	4
Asthma Seasonality	6
Interventions.....	6
Community Agencies	10
Schools.....	12
Churches.....	13
Acknowledgment.....	14
References	15

Tables

1. Characteristics and select indicators for Springfield and Missouri, 2018
2. Prevalence of current asthma among children aged 0-17 and adults ≥ 18 years, Southwest Region and Missouri, 2015
3. Key interventions to reduce pediatric asthma risk and improve control, Springfield, MO, 2009-2020

Figures

1. Rate of asthma emergency department visits among children aged 0-17 years, Greene County and Missouri, 2004-2015
2. Rate of asthma hospitalizations among children aged 0-17 years, Greene County and Missouri, 2004-2015
3. Zip codes in and surrounding Springfield, Missouri
4. Asthma inpatient hospital admission rates for children aged 0 to 19 years by month, Greene County and Missouri, 2004-2015
5. Asthma Dashboard Springfield Region, among age 0 to 20 years, 2018-2019
6. Children with Medicaid with HEDIS Persistent Asthma by School District, Missouri, 2014-2015
7. Medical facilities in and surrounding Springfield, Missouri, 2019
8. MO HealthNet Division (MHD) Primary Care Health Home Locations, February 2019
9. Schools in and surrounding Springfield R-XII District, Missouri, 2019
10. Percent of student's in attendance, receiving free and reduced lunch and the drop out rate, Springfield R-XII District and Missouri, 2019
11. Churches in Springfield and surrounding area, Missouri, 2019

SPRINGFIELD, MISSOURI

Springfield, located in southwestern Missouri, is the third largest city in the state and the county seat of Greene County.^{1,2} In 2018, Springfield's population was estimated at 168,122 (Table 1).³ Children and teens 0 to 17 years of age comprised slightly less of the population in Springfield than the state. African Americans made up less than 5% of the Springfield population compared to almost 12% in Missouri. In terms of income, the median household income in Springfield was lower (-32.5%) than the state in 2017 dollars (\$34,775 v \$51,542, respectively) and the percentage of persons living in poverty was almost twice that of the state (25.7% v 13.2%).

Springfield serves as a core for a metropolitan statistical area which includes five counties: Greene, Christian, Webster, Polk, and Dallas with a combined population of 440,142.⁴ Springfield is often described as the Queen City of the Ozarks. It lies in the northern limits of a humid subtropical climate and experiences times of exceptional humidity with wide ranges in weather patterns. Some consider Springfield to have the most varied weather in the United States.

The prevalence of current asthma among adults aged ≥ 18 years living in the southwest region of Missouri which includes Springfield, is similar to the state (Table 2).⁵ However, the southwest region prevalence of current asthma among children aged 0-17 years was 45% lower than the state.

Table 2. Prevalence of current asthma among children aged 0-17 and adults aged ≥ 18 years, Southwest Region and Missouri, 2015

	Adult % 95% Confidence Interval	Child % 95% Confidence Interval
<i>Southwest Region</i>	10.6 7.0 - 14.3	4.8 0.1 - 9.6
<i>Missouri</i>	9.6 8.6 - 10.6	8.7 6.7 - 10.6

Source: Missouri Department of Health and Senior Services. Behavioral Risk Factor Surveillance System.

Table 1. Characteristics and select indicators for Springfield and Missouri, 2018

Characteristics	Springfield	Missouri
Total	168,122	6,126,452
Age^y / Sex	Percent	Percent
0 - 17	18.0	22.5
18-64	67.1	60.6
≥ 65	14.9	16.9
Female	51.8	50.9
Education		
≥ Bachelor's degree ^{a,b}	27.7	28.2
Race		
White	88.2	83.0
African American	4.5	11.8
Other race	7.3	5.2
Hispanic / Latino	4.5	4.3
Indicators		
No Health Insurance < age 65	17.0	11.2
Persons in poverty	25.7	13.2
Households without a computer ^b	14.6	14.4

^y Years

^a Persons age 25 years+

^b 2013-2017

Source: U.S. Census Bureau. Quick Facts.

Asthma Control

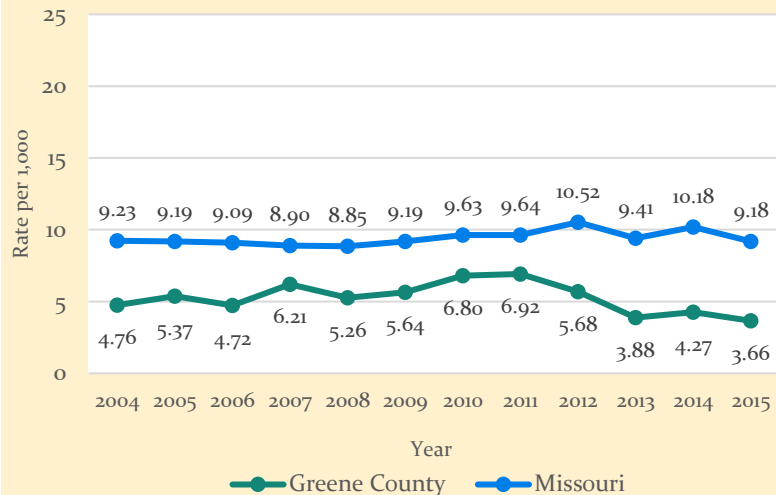
Asthma is a chronic respiratory condition that affects all ages and nationalities. According to the National Health Interview Survey, an estimated 25 million people in the United States (7.7% adults and 7.5% of children) currently have asthma (2018).⁶ While asthma occurs among all population groups, it is particularly a health issue among children and teens and is more common among African-Americans and in households with lower incomes and education. While asthma cannot be cured, the goal is optimal control. When asthma is controlled, people are able to live their lives and focus on learning, growing, prospering, and contributing to society.

Although more adults have asthma, approximately 55% of children with the condition in Missouri are uncontrolled leading to frequent symptoms and urgent asthma attacks resulting in impairment, absenteeism from school, and a disproportionate share of emergency department (ED) visits and hospitalizations. More than one-third of Missouri asthma ED visits (42.2%) and hospitalizations (31.5%) occurred among children age 17 years and younger in 2015.

Asthma Emergency Department Visits and Hospitalizations

Of the 12,295 total asthma emergency department (ED) visits that occurred among individuals living in Greene County (2004-2015), 29.7% (3,652) were among children 0 to 17 years of age. However, the Greene County asthma ED visit rates among children were consistently below that for Missouri (Figure 1). In addition, while the asthma ED visit rates among this age group have remained relatively stable in Missouri, there has been a significant decrease in Greene County comparing 2004 and 2015 (4.76, 95% CI 4.20-5.38 v 3.66, 3.19-4.18) (-23.1%).

Figure 1. Rate of asthma emergency department visits among children aged 0 to 17 years, Greene County and Missouri, 2004-2015



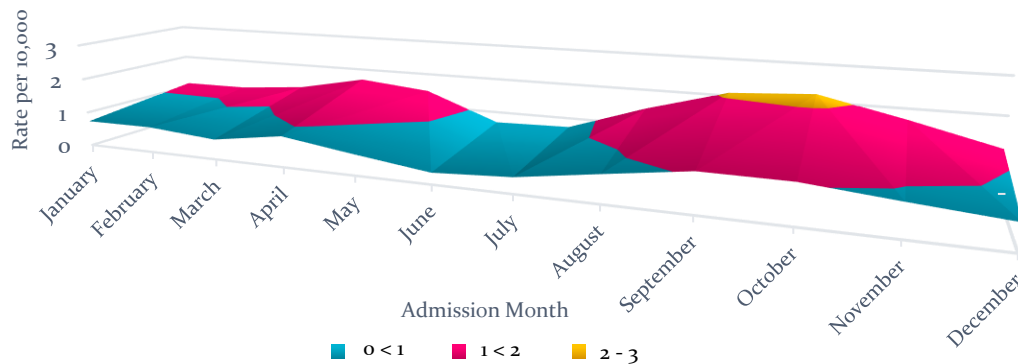
Source: Missouri Department of Health and Senior Services. Missouri Public Health Information Management System (MOPHIMS), Emergency Room Missouri Information for Community Assessment (MICA)

For the same 12-year period (2004-2015), there were a total of 2,336 asthma hospitalizations for people living in Greene County with 29.4% (686) among children 0 to 17 years of age. In Missouri, there was a statistically significant annual average decline of 2.5% in asthma hospitalizations among children 0 to 17 years of age 2004-2015 (Figure 2). Greene County also showed a significant decline in asthma hospitalizations among children comparing 2004 to 2015 (13.05, 95% CI 10.19 – 16.46 v 7.63, 5.59-10.18) (-41.5%).

Asthma Seasonality

Asthma ED visits and hospitalizations have seasonal patterns. For children and teens aged 0 to 19 the asthma hospital admissions rates by month for Greene County and Missouri show a bimodal distribution indicating two peak periods: 1) April and 2) September through October (Figure 4). Also shown is the substantial low plateau in asthma hospital admissions for children and teens for June and July in Greene County and Missouri.

Figure 4. Asthma inpatient hospital admission rates for children aged 0 to 19 years by month, Greene County and Missouri, 2004-2015



Source: Missouri Department of Health and Senior Services. Missouri Public Health Information Management System (MOPHIMS). Environmental Public Health Tracking (EPHT)

In 2015, inpatient hospital charges for children and teens aged 0 to 17 with asthma as the primary diagnosis in Missouri totaled \$20.8 million and children / teens from Greene County accounted for about 2% (\$430,000) of these charges. Teens 18 to 19 with asthma added about \$482,000 to the Missouri charges bringing the total to \$21. 2 million, however, the charges in Greene County were unchanged by adding this age group. Among children aged 0 to 17, Medicaid accounted for the largest pay source followed by commercial insurance for asthma hospital charges for both Greene County and Missouri. In Greene County for children aged 0 to 17 years, more than 80% of the charges were expected from Medicaid versus 66% for the state. As these data show, much of the asthma burden is on children and families enrolled in Medicaid.

Interventions

To focus interventions in areas of greatest need, a population risk framework along with a health care delivery and communication system were developed. These systems guide intervention implementation and quality improvement focusing on health care access via professional development, school nurse coordination, and health care linkages; and evaluation to inform the process and assess outcomes. Through an outcomes focused collaborative, MO HealthNet administrative data have been used to generate de-identified asthma risk panel risk reports and maps to identify areas with large numbers of children with uncontrolled asthma in Missouri.

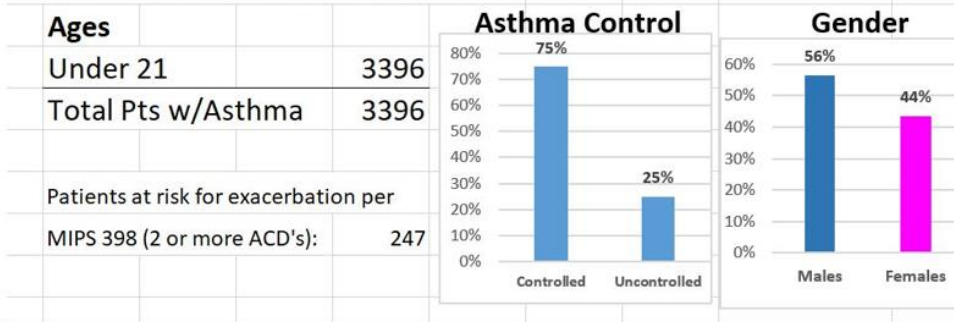
The asthma risk panel risk report for children, teens and young adults (< 21 years) in the Springfield region from these administrative data indicate that one-fourth (25.0%) of the children had uncontrolled asthma (Figure 5).

Figure 5.

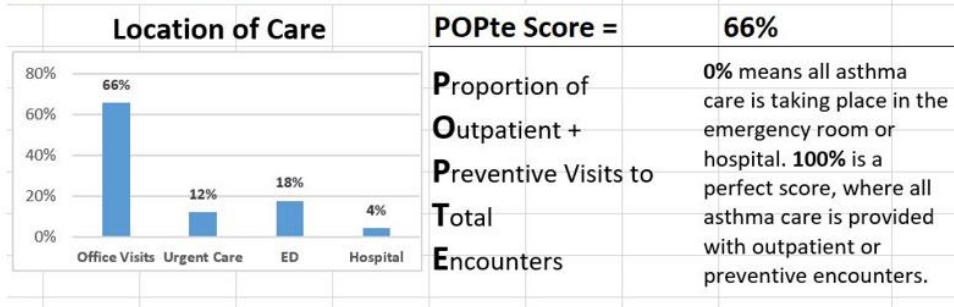
Asthma Dashboard Springfield Region

Data Range Between 8/1/18 and 7/31/19

WHO ARE MY ASTHMA PATIENTS?



WHERE ARE THEY GETTING CARE?



WHAT MEDICATIONS ARE THEY TAKING?

ICS	Percentage of all asthma patients who filled at least 1 ICS	30%
	Mean possession rate for patients who filled at least 1 ICS	30%
	Mean possession rate for patients w/uncontrolled asthma	17%
	Mean possession rate for all patients	9%
OCS	Total oral steroid bursts filled for all patients	1956
	Average OCS bursts per patient	0.58
	Number of patients with at least 2 OCS bursts	437

WHAT OPPORTUNITIES FOR CARE AM I MISSING?

Missed office visits based on 2 visits/yr for all patients	2945
Missed office visits based on 2/yr for controlled & 4/yr for uncontrolled	4633
Based on control, number of patient needing return visits in:	
30-60 days:	209
60-90 days:	74
90-120 days:	3075
Missed opportunity to bill 94664 inhaler training for each patient just once a year	3309

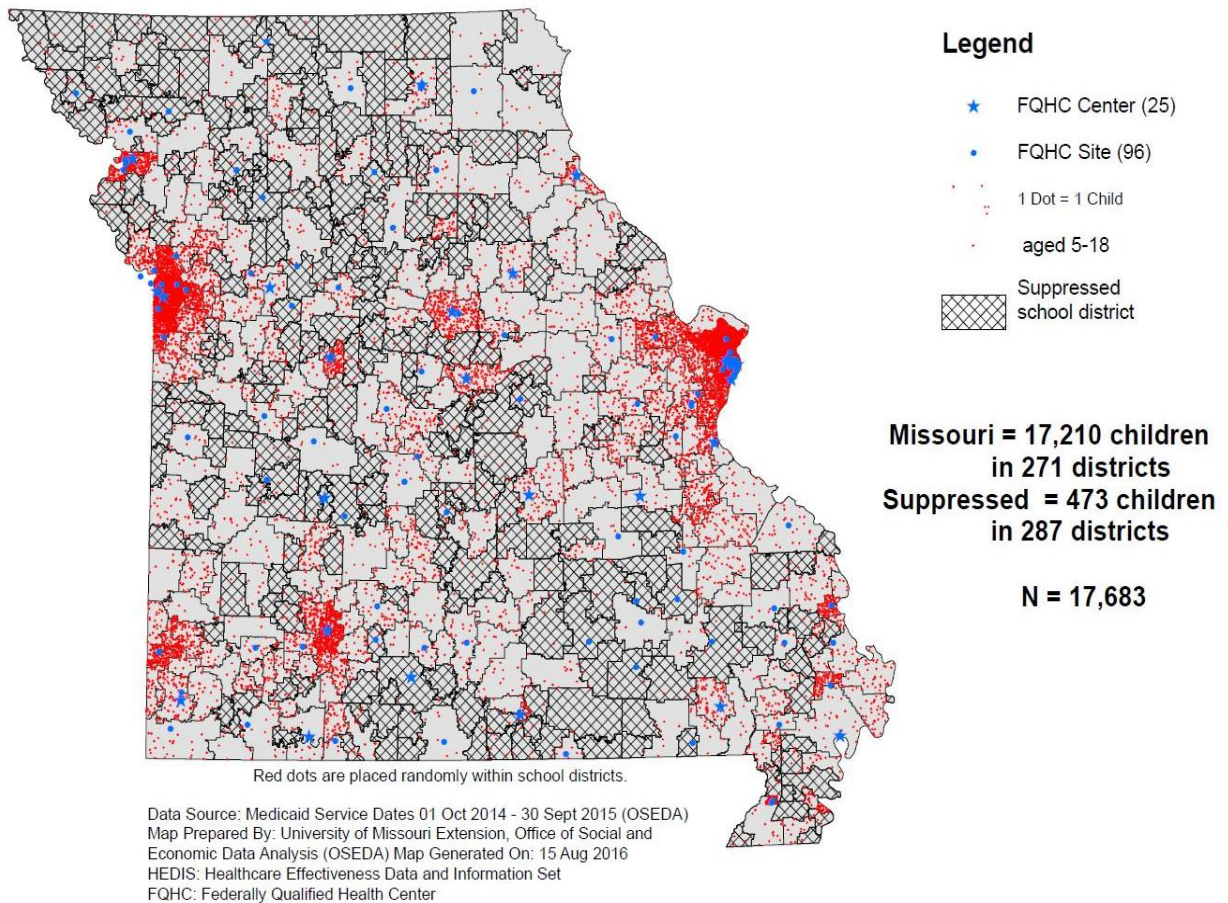
WHAT OTHER SERVICES CAN I OFFER?

Number of patients who are eligible for Health Home Enrollment	1198
Number of patients who are eligible for a Home Environmental Assessment	156

MIPS=Merit-Based Incentive Payment System, ACD=Acute Care Day, ICS=Inhaled Corticosteroid, OCS=Oral Corticosteroid

The map (Figure 6) shows several concentrated areas of children with persistent asthma enrolled in MO HealthNet (Medicaid) including the Springfield area. Persistent asthma was defined as having one or more asthma inpatient admission or emergency department visits or 4 asthma medication dispensed. While many children and teens in Greene County have persistent and/or uncontrolled asthma, there were no deaths with the underlying cause of asthma in Greene County among the 0 to 17-year old age group (2004-2018).

Figure 6. Children with Medicaid with HEDIS Persistent Asthma by School District, Missouri, 2014-2015



Commercial Street Historic District, Springfield, MO

*By Diedrichb, 2017
Creative Commons*

Applying the data and implementing evidence-based practices and community-wide interventions in Springfield and Greene County are showing results as demonstrated in the significant decline of asthma ED visits and hospitalizations among children and teens. The professional development participants were MD/DOs, RN/NPs, RTs, LPNs, MAs, CHWs, PhDs, students, and others. Legacy interventions such as the Childhood Asthma Linkages in Missouri (CALM) project⁷, School Nurse Awards, and Asthma School Manual, as well as current interventions including collaborative learning combined with health system, primary care, and community initiatives are contributing to advances in the long-term outcomes. The ARC administrative data contained more than 1,000 activity records for the Springfield area (Table 3). In addition, other interventions and initiatives such as CALM2, primary care health homes, home environmental assessments, and asthma panel risk reports not included in these data also provide asthma control support in this area and across the state and contribute to improving asthma outcomes and reducing costs.

Table 3. Key interventions to reduce pediatric asthma risk and improve control, Springfield, MO, 2009-2020

Intervention	Percent of participation records
Extension for Community Healthcare Outcomes (ECHO)	56.5
<ul style="list-style-type: none"> Impact Asthma – <i>Essentials</i> Asthma Care & Education - <i>Community</i> Asthma Care Accelerator – <i>Quality Improvement / Maintenance of Certification (QI/MOC)</i> 	38.1 10.2 8.2
Asthma Ready Clinic Training I and II	15.4
Becoming an Asthma Educator & Care Manager	13.4
Teaming Up for ,Asthma Control	5.8
Additional support – asthma care & education programs and site visits, EPR ₃ guidelines, and counseling for asthma risk reduction	3.3
Asthma Empowerment Springfield	
Asthma Academy	
Asthma Day	3.0
Asthma School Orientation	
Programs – <i>Acting on Behalf of My Child</i> and Asthma Care Everyday	
Community Health Worker education and training	
Presentations	2.6

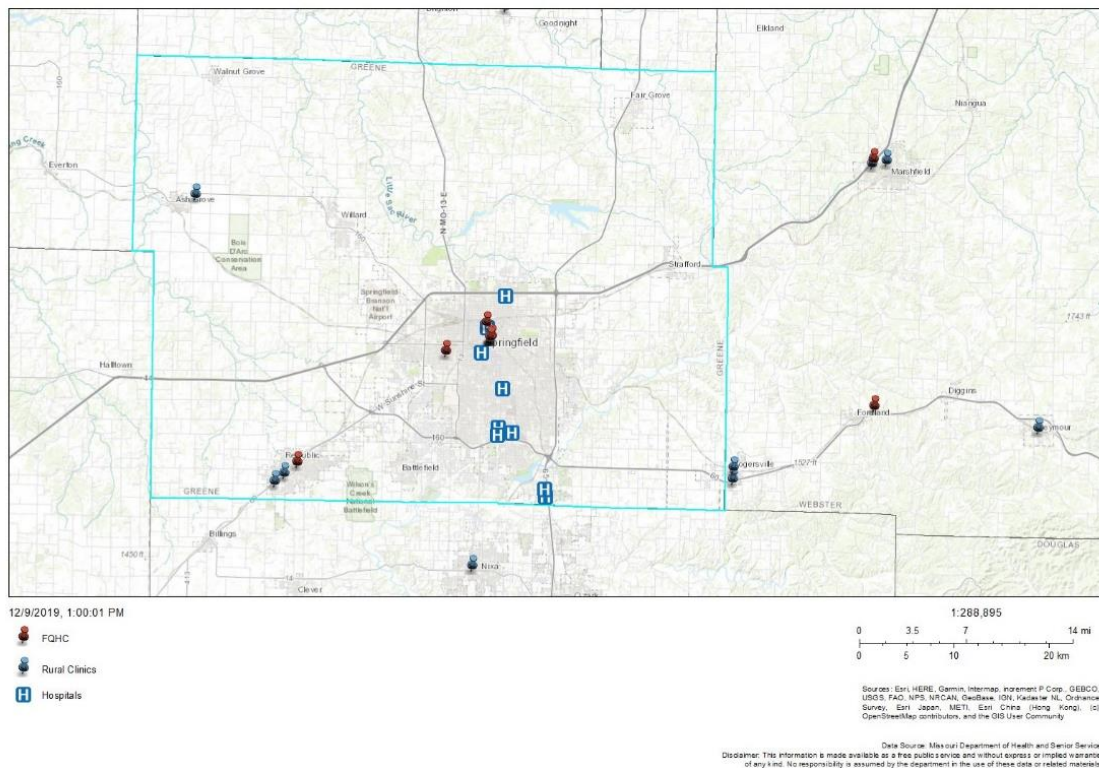
Source: University of Missouri, Asthma Ready Communities. Springfield activity records = 1,096.

Community Agencies

Springfield is a metropolitan area with great schools, a thriving job market, superior healthcare, a revitalized downtown, an active arts community, a moderate climate with all four seasons, outdoor recreation opportunities, beautiful neighborhoods, and friendly citizens.⁸ The health care system is comprised of hospitals, clinics, community health centers, public health, mental health services, schools, Medicaid and care management services, and community partners. CoxHealth System and Mercy Hospital are major employers making Springfield a regional acute care medical hub offering the latest medical technology and excellent physicians. There are also behavioral and psychiatric health centers (i.e., Perimeter Behavioral Health and Lakeland Behavioral Health), long-term care (i.e., Select Specialty Hospital) and a rehabilitation facility (i.e., Mercy Rehabilitation Hospital) (Figure 7). There are other private and voluntary agencies that provide services such as Burrell Behavioral Health, a private, not for profit organization that provides a wide range of mental health services.



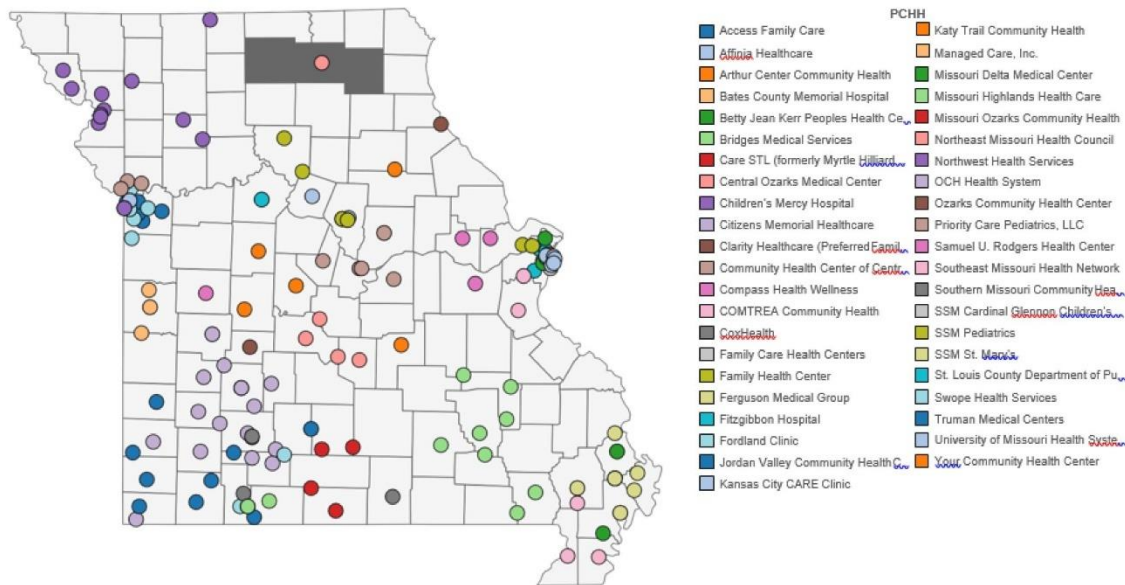
Figure 7. Medical facilities in and surrounding Springfield, Missouri, 2019



There are three MO HealthNet Division Primary Care Health Home providers in Springfield: 1) CoxHealth (CoxHealth Northside Pediatrics/Adolescents and Family Medical Care Center), 2) Jordan Valley Community Health Center (West Springfield and Springfield), and 3) Ozarks Community Hospital (OCH) Health System (OCH Primary Care) (Figure 8). The Springfield-Greene County Health Department is an active public health agency, operates a clinic, and recently completed a comprehensive assessment of mental health resources.

Figure 8.

MHD Primary Care Health Home Locations February 2019



The City of Springfield host a community resources webpage <https://www.springfieldmo.gov/506/Community-Resources> and

The Greene County Missouri Assistance program offers a list of resources at: https://www.needhelppayingbills.com/html/greene_county_assistance_progr2.html

A recent report *Community Focus 2019; A Report for Springfield & Greene County* discusses the many resources available and the area's strengths (Blue Ribbons) and challenges (Red Flags) <https://springfieldcommunityfocus.org/community-focus-2019-report.pdf>. This report is a collaboration between the Community Foundation of the Ozarks, United Way of the Ozarks, Springfield-Greene County Library District, Junior League of Springfield and Springfield Area Chamber of Commerce. This latest report highlights six areas: community mental health, cooperation, diversity, economic opportunity, poverty and homelessness, and social capital.

A faith-based organization, GO:61 has also developed an extensive Springfield, Missouri area resource list and is posted at: http://www.go61.org/uploads/4/6/4/0/46401663/community_resource_list_springfield_mo.pdf

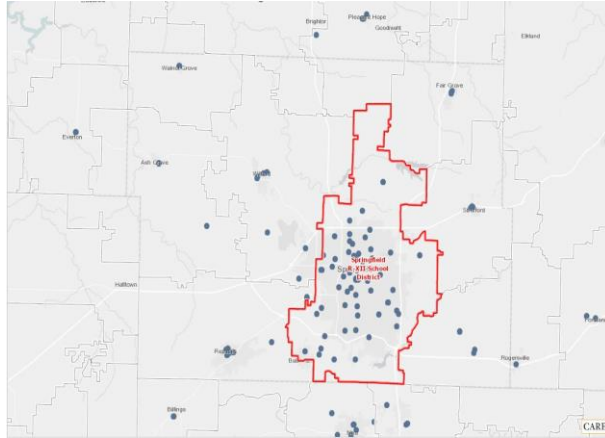
Schools

For the school year 2018-2019, there were eight school districts in Greene County: Ash Grove, Fair Grove, Logan-Rogersville, Republic, Springfield, Strafford, Walnut Grove, and Willard.⁹ These eight districts have a total student population of more than 40,000 with the Springfield School district (Figure 9) having 63% of these students.

Springfield Public School district is Missouri's largest fully accredited school district with more than 25,000 students (or about 3% of Missouri's total public-school student population) attending 38 elementary schools, nine middle schools, and five high schools. Springfield Public School district is similar to the state on selected indicators from the Missouri Assessment Program data including more than 50% of students receiving free and reduced lunches (Figure 10).

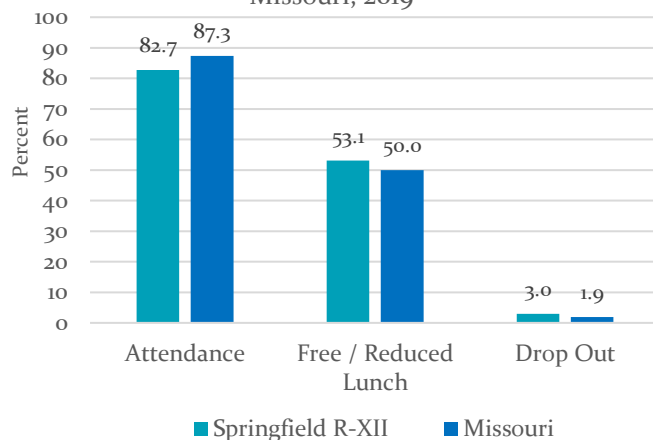
In addition to the public school district, Phelps Gifted Center serves grades 01 to 12 and there are two preschools including Shady Dill Early Childhood Center and Shining Stars Early Childhood Center. Greene County is also home to three colleges (Baptist Bible College, Ozarks Technical Community College, and Everest) and three universities (Missouri State University, Drury University, and Evangel University).

Figure 9. Schools in and surrounding Springfield R-XII District, Missouri, 2019



Source: University of Missouri, Center for Applied Research and Engagement Systems (CARES).

Figure 10 Percent of student's in attendance, receiving free and reduced lunch and the drop out rate, Springfield R-XII District and Missouri, 2019



Source: Missouri Department of Elementary and Secondary Education. Missouri Assessment Program.

Churches

There is an array of churches in Greene County including Baptist, Methodist, Catholic, Pentecostal and Assembly of God, Lutheran, Protestant, Christian, non-denominational and other churches (Figure 10). The location of many of the churches may be found through online search portals such as *Church Finder – Churches in Springfield, Missouri*

<https://www.churchfinder.com/churches/mo/springfield> (Figure 11) and *Churches-In.com*

<http://www.churches-in.com/missouri/Springfield/>



Figure 11. Churches in Springfield and surrounding area, Missouri, 2019



Acknowledgment

This report was made possible through a collaboration of the University of Missouri – Department of Child Health and Center for Applied Research and Engagement; Missouri Department of Social Services, MO HealthNet Division; Office of Social and Economic Data Analysis; Missouri Asthma Prevention and Control Program staff; and partners. The following individuals made important contributions:

Sherri Homan, PhD, RN, FNP: Public Health Epidemiologist, Asthma Ready Communities, University of Missouri: Principal, SuRE Writing LLC

Ben Francisco, PhD, PNP-BC, AE-C: Director
Asthma Ready Communities and Teaming Up for Asthma Control, University of Missouri

Paul Foreman, PhD, MS, MA, Project Director, Asthma Ready Communities

Tammy Rood, PhD, CPNP-PC AE-C: Program Coordinator
Asthma Ready Communities and Teaming Up for Asthma Control, University of Missouri

Rebecca Brown, MPA, AE-C, RRT:
Community Asthma Coordinator, Asthma Ready Communities, University of Missouri

Michelle Dickens, FNP, CoxHealth Ferrell Duncan Allergy Clinic

Julie Patterson, BA, Asthma Ready Communities, University of Missouri

Eric S. Armbrrecht, PhD: Lead Evaluator, Missouri Asthma Prevention and Control Program; Principal, Open Health LLC

Peggy Gaddy, RRT, MBA: Missouri Asthma Prevention and Control Program Manager, Missouri Department of Health and Senior Services



References

- ¹ U.S. Census Bureau, Population Division. American Fact Finder. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. Release Dates: For the United States, regions, divisions, states, and Puerto Rico Commonwealth, December 2018. For counties, municipios, metropolitan statistical areas, micropolitan statistical areas, metropolitan divisions, and combined statistical areas, April 2019. For cities and towns (incorporated places and minor civil divisions), May 2019. <https://www.census.gov/quickfacts/fact/table/US/PST045218>
- ² Wikipedia. Greene County, Missouri. Retrieved December 5, 2019, from https://en.wikipedia.org/wiki/Greene_County,_Missouri
- ³ U.S. Census Bureau. Quick Facts – Springfield city, Missouri. Retrieved 12/2/2019, from <https://www.census.gov/quickfacts/fact/table/MO.springfieldcitymissouri,US/PST045218>
- ⁴ Office of Management and Budget. Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas. 2018. Retrieved 12/4/2018 <https://www.whitehouse.gov/wp-content/uploads/2018/09/Bulletin-18-04.pdf>
- ⁵ Missouri Department of Health and Senior Services. Behavioral Risk Factor Surveillance System, 2015 Report. Retrieved December 5, 2019, from <https://health.mo.gov/data/brfss/2015datareport.pdf>
- ⁶ Centers for Disease Control and Prevention (CDC). 2018 National Health Interview Survey Data. Atlanta, Ga: National Center for Environmental Health, Asthma and Community Health Branch. <https://www.cdc.gov/nchs/fastats/asthma.htm>
- ⁷ Missouri Foundation for Health. Childhood Asthma Linkages in Missouri (CALM). Retrieved 3/20/2020, from <https://mffh.org/wp-content/uploads/2016/04/CALM-infographic-report-FINAL.pdf>
- ⁸ Springfield Public Schools. Our Community. Retrieved December 11, 2019, from <https://www.sps.org/Page/2632>
- ⁹ Missouri Department of Elementary and Secondary Education. Missouri School Directory, 2019. Retrieved December 5, 2019, <https://dese.mo.gov/school-directory>