ASSESSMENT OF **NASHVILLE** REGION HEALTH, COST, ACCESS, AND QUALITY

RESULTS OF A PILOT STUDY

Nashville AREA CHAMBER of COMMERCE
THE RESEARCH CENTER

Center for
Healthcare Economics and Policy

FTI™ CONSULTING

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Message from Community Partners

An issue of great importance to the Nashville region is that all residents are able fully to participate in and contribute to the economic prosperity of the region. The intersection between a productive, healthy population and the region's relative cost, quality, and access to healthcare is an important relationship to examine as we drive toward that larger goal. The Nashville area is widely recognized for its quality of life and economic competitiveness, largely attributed to our strong public-private partnerships and regional collaboration. To build on our strengths, we know we must work together to create community-driven solutions on issues that impact our current and future well-being.

One framework used to spur such dialogue is Nashville Region's "Vital Signs," a collaborative process led by the Nashville Area Chamber of Commerce and the Nashville Area Metropolitan Planning Organization to track priority issues and activate solutions. In 2013, the Chamber, in partnership with MPO, launched "Vital Signs" for our region. This process started a broader community conversation about what is important to move our region forward. The quality of our workforce and linkages to the health status of the population emerged as an issue in need of additional attention.

Following the U.S. Chamber's 2013 Healthcare Summit, the Nashville Area Chamber began conversations with FTI Consulting's Center for Healthcare Economics and Policy about commissioning an innovative pilot study to assess cost, quality, and access to healthcare in the Nashville region. As participants in the larger business community and region, our organizations committed to combining our resources to undertake this important pilot study. The study offers a comprehensive profile of health status and healthcare costs in the Nashville region – critical components of quality of life. By providing consistent and robust assessment using extensive locally relevant data and comparison with Nashville's peer regions, the study provides meaningful and actionable data for this region as it addresses and markets its strengths and comparative position among peer metro regions.

As we create strategies to manage our region's growth and development, the locally relevant data and analyses from this study shine a light on critical opportunities and needs. Through this process, we have found many areas where we are excelling, as well as issues that present opportunity for improvement along with sound insights for potential strategies and next steps. By undertaking this pilot study, we also hope to create a replicable model for other communities interested in creating community-driven solutions to improve the health and well-being of their populations.

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Description of the Pilot Study

The Nashville Area Chamber's Research Center spearheaded a partnership to commission an innovative healthcare pilot study to assess cost, quality, and access in the Nashville region in collaboration with FTI Consulting's Center for Healthcare Economics and Policy. The pilot study includes several features that distinguish it from many rankings reports and other studies, including comprehensive assessment of physician supply and growth, use of extensive commercial claims data along with Medicare data to assess costs and utilization of healthcare services for specific chronic diseases (e.g., diabetes) to facilitate workforce assessments and presentation in an analytical framework that provides for sound performance and comparative assessments.

The analyses and information presented in this pilot study build on key issues affecting the Nashville community reported in the Nashville Chamber of Commerce Research Center's 2014 Nashville Region's "Vital Signs." Topics analyzed in Vital Signs included transportation, economic vitality, human capital, and quality of place and life; the last involved health factors. Vital Signs reported measures such as physical activity, weight, insurance coverage, smoking, healthy eating, and health equality — and identified that the Nashville region faces some challenges regarding the promotion of healthy lifestyles, including a relatively low level of physical activity, high obesity, and a high smoking rate. Health equity also is a concern; a disproportionate share of less financially affluent individuals report having poor or fair health. Many "Vital Signs'" findings are presented in a comparative context, with Nashville's performance compared against a set of peer Metropolitan Statistical Areas (MSA). The same 10 MSAs are used to construct a peer group for this pilot study with which to compare and contrast Nashville's performance in various health and healthcare-related measures.

I. Executive Summary

An unprecedented rise in healthcare costs without corresponding improvement in health outcomes over the past two decades casts population level health and healthcare into the national spotlight. Many factors influence healthcare costs and contribute to the high rate of growth. Personal behaviors and lifestyle choices have a substantial effect. Chronic conditions (long-standing conditions that affect health; for example, diabetes or heart disease) are more prevalent today than at any time in the past and, in many cases, can require a lifetime of treatment. Chronic conditions consume three-quarters of the dollars spent on healthcare today.[1] Smoking-attributable diseases and the resulting loss in productivity account for an estimated $193 billion in costs over a five-year period.[2] Obesity is a leading risk factor for diabetes, heart disease, and stroke; the U.S. Chamber of Commerce and the Partnership for Prevention estimate that the financial impact due to obesity is $117 billion annually in the United States alone.[3] Access to care and delivery of preventive care also have a significant impact on health and costs. Physicians and healthcare providers are uniquely positioned to influence health and healthcare costs through preventive care and by managing and coordinating care to improve patient health and reduce wasteful consumption of resources such as unnecessary emergency room visits. They play important roles in supporting and improving community health by providing high quality care.

The potential for a high quality of life is one of the most valuable benefits a community can offer its residents. Although quality of life involves several elements, health status and healthcare costs are critical components. Healthy people are able to enjoy life, support their families, and contribute meaningfully to their communities. A healthy workforce leads to high productivity in the workplace; and a healthy population contributes to the greater prosperity of a region. Communities competing for prospective employers and for a strong workforce with an adequate supply of workers must consider the health status of their residents. Considering health status is critical because illness has a profound effect on workforce productivity. Chronically ill employees have higher healthcare utilization than their healthier counterparts.[4] Absenteeism, presenteeism, and even the inability to work can be the byproducts of disease and illness.

A key question communities often consider is: How does my area compare in terms of population level health and healthcare delivery with other areas? Answering this question can help identify the key areas of need in the community and is an important step in developing opportunities for improvement. In recent years, scorecards have been developed and used to compare various health metrics across geographies. Publicly available health scorecards and rankings provide a starting point, but these resources present certain challenges. A community's score or ranking may not fully reflect differences in the effectiveness of regional policy or public health initiatives because these rankings may be composites of several measures.[5] Differences in the characteristics of the underlying population such as average age or income may influence relative rankings in unknown ways. Also, limitations inherent in the data used in the rankings can render some metrics imprecise or inaccurate in a particular area.

Nashville stakeholders discovered that health scorecards and rankings provided strong signals of issues in their local community, both generally and compared with other communities, including peer communities. Most identified chronic conditions and health behaviors as potential areas of concern for Nashville.[6] At the same time, commonly used metrics and scorecards provided inconsistent messages about the presence or severity of a specific issue for Nashville, and these metrics often were available only for a subset of the population (e.g., Medicare enrollees) or were not locally relevant.[7]

A constraint faced by many communities seeking to promote health and change in their local regions is the lack of reliable data and measures that provide a clear understanding of specific conditions and measures such as cost or utilization or to provide ability for further inquiry into relationships between conditions and costs.[8] Nashville stakeholders have overcome a major hurdle facing many communities, which is the ability to develop an effective collaboration of leaders from business, municipalities, and providers to undertake the needed

1 *The Power of Prevention: Chronic Disease – The public health challenge of the 21st Century,* Centers for Disease Control and Prevention's (CDC) National Center for Chronic Disease Prevention (2009), 2:3: **http://www.cdc.gov/chronicdisease/pdf/2009-Power-of-Prevention.pdf**.

2 Estimated for the period 2000-2004, Centers for Disease Control and Prevention, **Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses — United States, 2000-2004**. Morbidity and Mortality Weekly Report. November 14, 2008, 57(45): 1226–28.

3 Partnership for Prevention and U.S. Chamber of Commerce, *Healthy Workforce 2010 and Beyond*, 2010.

4 Health status, aging, and the impact of chronic disease on workforce productivity and sustainable workforces have been the focus of World Economic Forum studies by coalitions of major businesses. These studies emphasized the importance of identifying reliable metrics and methods for evaluation of strategies with the greatest impact. See, e.g., World Economic Forum (2013), The Workplace Wellness Alliance — Making the Right Investment: Employee Health and the Power of Metrics in Collaboration with FTI Consulting. See **http://www.weforum.org/reports/workplace-wellness-alliance-making-right-investment-employee-health-and-power-metrics**.

5 The Commonwealth Fund's *Scorecard on Local Health System Performance*, the *University of Wisconsin County Health Rankings*, and the *Dartmouth Atlas of Healthcare*, for example, are three prominent sources of community health rankings with data on local geographies such as counties or metropolitan areas. There are many different measures and methodologies used to measure, score and compare or rank geographies with each other across these three sources. A more complete discussion is provided in the Appendix. The Commonwealth Fund (**http://www.commonwealthfund.org/**); University of Wisconsin County Health Rankings (**http://www.countyhealthrankings.org/**); and the Dartmouth Atlas (**http://www.dartmouthatlas.org**).

6 For example, The Commonwealth Fund ranked the Nashville region lower on overall performance relative to many metropolitan areas. The Commonwealth Fund's overall performance measure is an aggregation of access and affordability, preventable hospitalizations and cost, preventive treatment, and potential to lead healthy lives. See The Commonwealth Fund's *Scorecard on Local Health System Performance (2012)*, p. 92.

7 Sources of differences in rankings and measures are discussed in the Appendix; many commonly used metrics tend to be available only at the county or state level and may be available for regions commonly used for healthcare metrics but not for other common business or economic indicators. For example, United Health Foundation's America's Health Rankings 2014 includes state-level data for Tennessee, and The Commonwealth Fund uses Hospital Referral Regions (HRRs). There still are some areas of common findings with those in this report. For example, The Commonwealth Fund also ranked the Nashville region higher on access and affordability than many metropolitan areas, including virtually all of the peer metro areas discussed.

8 See, e.g., Alan Weil, "It Takes a Community," *Health Affairs,* November 2014, for an overview of a symposium volume on community efforts to engage on healthcare issues.

assessment and development of information required for more complete evaluation of needs and potential strategies.[9]

This pilot study report presents a comparative health analysis for Nashville and provides an assessment of many leading measures of population health and of key aspects of the healthcare delivery system, including robust data and information on leading indicators for healthcare and health behaviors. The assessment is intended as a starting point for stakeholders to provide an enhanced understanding of opportunities to promote and improve health and the quality of healthcare in Nashville.

This report contains a community-specific analysis that provides solid, accurate, and relevant information and insights on both the health of those in the Nashville region and on certain components of the healthcare system. Our analysis includes several key features that allow for a more comprehensive assessment for stakeholders in the Nashville region than what typically is available from community-level scorecards or rankings. While all provide a wealth of information, we incorporate and focus on new, meaningful measures that provide insight into health system performance in a framework tailored to facilitate more meaningful comparisons across communities.

Many of the important health measures presented in the Nashville Region's "Vital Signs" report provide the baseline of this report and serve as the starting point for the specific chronic condition and health behavior analysis. We expand our analysis to include specific metrics that are critical in enabling stakeholders with the information to evaluate and ultimately track their community across the five categories of population health, utilization, cost, quality, and access. We develop these community-level metrics based on our own experience and also on a review of approaches increasingly taken by other local and state Accountable Health Communities that seek a more simplified, yet robust, set of measures grounded in reliable data that permit cross-community comparisons.

The framework for our analysis includes five key components:

- Population level health assessment; including chronic conditions and health behaviors
- Access to care, including insurance coverage, physician supply, changes in physician supply over time, and hospital capacity
- Healthcare utilization for both the commercially insured and the Medicare population; and for patients with specific chronic conditions[10]
- Healthcare cost for both the commercially insured and the Medicare population
- Hospital quality measurements

To provide the most useful framework for Nashville's stakeholders, we expand upon the usual datasets that track quality, utilization, and costs to include extensive commercial claims data. We expand our analysis of insurance coverage to include the commercially insured. Where other reports rely on the population of Medicare beneficiaries to explore health resource utilization, we use this extensive commercial claims database to assess and draw conclusions about utilization, costs, and chronic conditions in the commercially insured population (under age 65). The commercial claims data provide a unique and richer locally relevant perspective as healthcare utilization among this younger cohort is different from that of Medicare beneficiaries. We also focus our analysis on workforce implications. While high utilization of healthcare resources is costly in monetary terms, it also has an indirect cost on productivity in that an unhealthy worker often requires additional time spent away from work. To quantify productive time lost due to certain chronic conditions in the Nashville area, we estimate the average number of doctor office visits and inpatient admissions for an individual living with a chronic disease. These visits and admissions amount to the potential productivity cost related to a disease.

9 See, e.g., Institute of Medicine, *Business Engagement in Building Healthy Communities*, (2015) for discussion of issues confronting communities in collaboration efforts and principles for successful effort. The Nashville community has been very engaged in assessing health profiles across the range of constituencies with recent Community Health Needs Assessments by our providers; *Vital Signs* (2013 and 2014); and the Metro Public Health Department's "Community Health Profile" for Metro Nashville – Davidson County," 2014. These identify common challenges and provide important complementary information on demographics, socio-economic and environmental factors and trends along with substantial detail on resources in the community. See Appendix for detail.

10 This report examines data and information on access, insurance coverage, healthcare infrastructure (e.g., physician supply, chronic conditions, and health behaviors across the entire populations in the areas studied using the best available and robust data for the areas studied, recognizing that these factors affect all populations. Chronic conditions may disproportionately affect those uninsured or economically disadvantaged. Our analysis of healthcare utilization and costs in this pilot report uses Medicare data and comprehensive commercial claims data to examine utilization and costs in each area; commercial claims data are also used to assess utilization and costs for specific chronic conditions.

The analysis is presented in a comparative context; information is provided for Nashville and 10 designated peer Metropolitan Statistical Areas (MSA). This represents a refinement over metrics provided in other reports and studies – MSAs provide effective units of analysis for a broader set of economic and other data and take into account interconnectedness between communities located in metropolitan areas. MSAs also allow for the use of reliable data consistently measured across all geographies reviewed in this report. Another difference between our report and other comparative community health assessments is the use of a methodology to take into account differences among populations across cities when examining health and health behaviors across communities. This permits one to distinguish between differences in rates due to differences in health behavior and/or healthcare from those that primarily are due to differences in the demographic makeup of a community. In turn, this provides for a useful way for policymakers and decision makers to evaluate the comparisons between communities when considering certain actions or interventions that can affect health behavior or healthcare within a community.

The findings presented in this report have broad implications. Ultimately, wellness is a local problem with national implications. To drive change, stakeholders must identify and agree upon community health priorities. This requires the ability to sort effectively through the plethora of data and information and identify the most salient factors influencing health outcomes and measures in their community. Stakeholders then must work together so that employer-sponsored, community-led, or provider-sponsored programs or policies are tailored to meet community needs. Significant gains are possible when employers, community leaders, and providers work together to address the health needs of the population, align resources, and coordinate care delivery.

Included among the key findings of this pilot are:

- High insurance coverage rates and strong physician supply, coupled with high quality of care, demonstrate that the appropriate care delivery components are in place to effectively meet the healthcare needs of the Nashville population.
- Compared with other areas analyzed, healthcare is relatively more affordable in Nashville. Nashville's residents can access high quality of care that meets their specific healthcare needs with relatively low average payments.
- A high level of connectivity between Nashville's residents and the healthcare system suggests that physicians may be able to better drive change in health behaviors than in other comparable communities that have lower levels of connection and access. Failing to take advantage of this as a resource to drive change would represent a missed opportunity.
- Nashville's relatively high utilization rates for healthcare services for chronic disease conditions, however, may indicate that an opportunity for enhanced coordination of care also exists, as well as opportunities for cost savings, improved health and productivity.

It is our hope that the findings presented in this report spur stakeholder involvement. Reducing the smoking rate is a top-priority national health objective, but the smoking rate in Nashville remains high. The implications of a high smoking rate are evidenced through examining chronic obstructive pulmonary disease (COPD), a disease attributed to smoking. This report shows that patients with this disease incur expensive treatment and may have lower productivity due to time away from work. Given the characteristics of the healthcare delivery system, physicians acting as strong advocates of tobacco cessation may prove particularly effective in reducing the smoking rate. Employers may find a role in these initiatives and also find that they have a role in addressing other health needs of the population.

Mental health, as approximated by depression and stress, is an area where Nashville is at the midpoint of its peer group, before and after adjusting the population in comparison areas to account for differences in demographics. The chronic condition analysis demonstrated that depression is associated with a high utilization of healthcare services, which ultimately translates into a productivity loss conservatively estimated of approximately four days per year.[11] Efforts designed to promote mental health in the workplace may prove particularly cost effective and high valued when considering the full cost of the condition. In each of these areas — and in others — stakeholders can build from this pilot and identify locally relevant targets and goals, whether they be national or regional benchmarks or ones tailored to a peer group. Findings in each of these areas of health and health behaviors, coupled with further or complementary research, also can be used to identify and address factors that would enhance achieving improved health outcomes for Nashville residents.

The current healthcare expenditure trajectory is one that cannot be maintained. Declines in population level health and increases in overall cost and expenditures have reached a tipping point. The human toll is unacceptable. Possibilities for improvement exist, and synergies can be exploited to bring about meaningful change. In combining extensive high-quality data with insightful analysis, opportunities for intervention can be identified to drive change and improve community level health and well-being. Action taken today will lead to a more sustainable future for all.

11 We note that higher utilization does not necessarily imply excess utilization and can reflect health utilization that may be able to be reduced with reduction or improvement in the incidence of the underlying condition.

II. Introduction and Overview

An unprecedented rise in healthcare costs over the past two decades casts population level health and healthcare into the national spotlight. Many factors influence healthcare costs and contribute to the high rate of growth. Personal behaviors and lifestyle choices have a substantial effect. Chronic conditions (long-standing conditions that affect health; for example, diabetes or heart disease) are more prevalent today than at any time in the past and, in many cases, can require a lifetime of treatment. Chronic conditions consume three-quarters of the dollars spent on healthcare today.[12] Smoking-attributable diseases and the resulting loss in productivity account for an estimated $193 billion in costs over a five-year period.[13] Obesity is a leading risk factor for diabetes, heart disease, and stroke; the U.S. Chamber of Commerce and the Partnership for Prevention estimate that the financial impact due to obesity amounts to $117 billion annually in the United States alone.[14] Access to care and delivery of preventive care also can have a significant impact on health and costs. Physicians and healthcare providers are uniquely positioned to influence health and healthcare costs through preventive care and by managing/coordinating care to improve patient health and reduce wasteful consumption of resources such as unnecessary emergency room visits. Hospitals have a direct effect on patient health and a role in supporting and improving community health by providing high quality care.

This pilot study report presents a comparative health analysis for Nashville and provides an assessment of population health and of certain aspects of the healthcare delivery system.[15] The assessment is intended as a starting point for stakeholders to provide an enhanced understanding of opportunities to promote and improve health and the quality of healthcare in Nashville. Our analysis includes several key features that permit a more comprehensive assessment for stakeholders in the Nashville region than what typically is available from community level scorecards or rankings. The Commonwealth Fund's *Scorecard on Local Health System Performance*, the *University of Wisconsin County Health Rankings*, and the *Dartmouth Atlas of Healthcare*, for example, are three prominent sources of community health rankings.[16] While all provide a wealth of information, we incorporate and focus on new, meaningful measures that provide insight into health system performance in a framework tailored to facilitate more meaningful comparisons across communities.

We augment the standard healthcare assessment by analyzing physician supply (both in aggregate and by specialty). We expand our analysis of insurance coverage to include the commercially insured. Where other reports rely on the population of Medicare beneficiaries to explore health resource utilization, we use commercial claims data to assess and draw conclusions about the commercially insured population (under age 65). The commercial claims data provide a unique perspective as healthcare utilization among this younger cohort is different from that of Medicare beneficiaries.[17] We also conduct our analysis with an eye on the workforce implications. While high utilization of healthcare resources is costly in monetary terms, it also has an indirect cost on productivity in that an unhealthy worker often requires additional time spent away from work. To quantify productive time lost due to certain chronic conditions, we estimate the average number of doctor office visits and inpatient admissions for an individual living with a specific chronic disease. These visits and admissions amount to the potential productivity cost related to a disease.

One key difference between our report and the other comparative community health assessments is that we use a methodology to control for population diversity when assessing health and health behaviors across communities. This enables us to distinguish between differences in rates due to differences in health behavior and/or healthcare from those that primarily are related potentially to differences in the demographic makeup of a community. This provides for a more useful way for policymakers and decision makers to evaluate the comparisons between communities when considering certain actions or interventions that can affect health behavior or healthcare within a community.[18]

The health analysis is based on five key components:

- Population level health assessment; including chronic conditions and health behaviors
- Access to care, including insurance coverage, physician supply, changes in physician supply over time, and hospital capacity
- Healthcare utilization for both the commercially insured and the Medicare population; and for patients with specific chronic conditions[19]

12 *The Power of Prevention: Chronic Disease – The public health challenge of the 21st Century*, Centers for Disease Control and Prevention's National Center for Chronic Disease Prevention (2009), 2:3: **http://www.cdc.gov/chronicdisease/pdf/2009-Power-of-Prevention.pdf**.

13 Estimated for the period 2000-2004, Centers for Disease Control and Prevention, **Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses — United States, 2000–2004**. Morbidity and Mortality Weekly Report. November 14, 2008, 57(45): 1226–28.

14 Partnership for Prevention and U.S. Chamber of Commerce, *Healthy Workforce 2010 and Beyond*, 2010.

15 This framework can be readily applied to other areas in Tennessee, including Chattanooga, Kingsport, Knoxville, and Memphis MSAs, and other large MSAs that are included in the CDC'S Behavioral Risk Factor Surveillance System (BRFSS)/Selected Metropolitan/Micropolitan Area Risk Trends (SMART) dataset, including peer MSAs.

16 For more information, see The Commonwealth Fund (**http://www.commonwealthfund.org/**); University of Wisconsin County Health Rankings (**http://www.countyhealthrankings.org/**); and the Dartmouth Atlas (**http://www.dartmouthatlas.org/**).

17 Commercial claims data are from Truven's MarketScan® Commercial Claims and Encounter Research Database, which includes a sample of claims of commercially insured patients and their families seeking treatment across the United States. It contains information about diagnoses, procedures, and payments. The commercial claims sample used in the analysis generally is thought to be largely representative of working age employees with commercial insurance.

18 As we discuss further below, researchers and policymakers are increasingly recognizing the importance of controlling for these differences when examining or comparing outcomes or quality data across communities or providers.

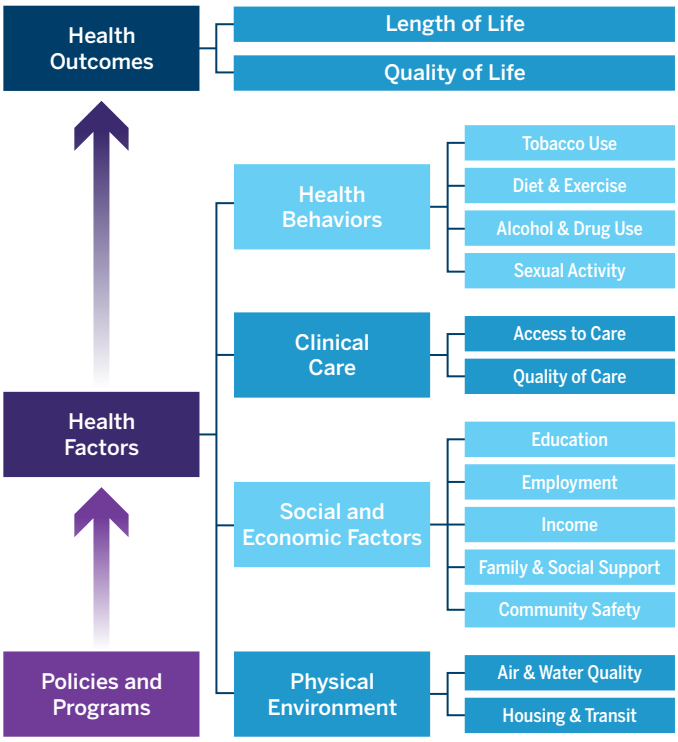
19 This report makes use of best available and robust data and information on population health measures, including chronic conditions and health behaviors, and on physician supply, hospital capacity, and insurance coverage on a total population basis in each area studied. Our assessment of healthcare utilization and costs makes use of Medicare data, and comprehensive commercial claims data.

- Healthcare cost for both the commercially insured and the Medicare population
- Hospital quality measurements

Many of the important health measures presented in the Nashville Region's "Vital Signs" report form the baseline of this report and serve as the starting point for chronic condition and health behavior analysis. We expand our analysis to include specific metrics that are critical for enabling stakeholders with the information to evaluate and ultimately track their community across the five categories of population health, utilization, cost, quality, and access. We develop these community-level metrics — or leading indicators — based on our own experience and also on a review of approaches increasingly taken by other local and state Accountable Health Communities that seek a more simplified, yet robust, set of measures grounded in reliable data that permit cross-community comparisons.[20] To provide the most useful framework for Nashville's stakeholders, we expand upon the usual datasets that track quality, utilization, and costs to include extensive commercial claims data.

Population health is a broad term, and involves a broad set of components. Many community health assessments focus on factors broadly categorized in the following four categories: Health Behaviors, Clinical Care, Social and Economic Factors, and Physical Environment, as depicted in **Figure 1**.[21]

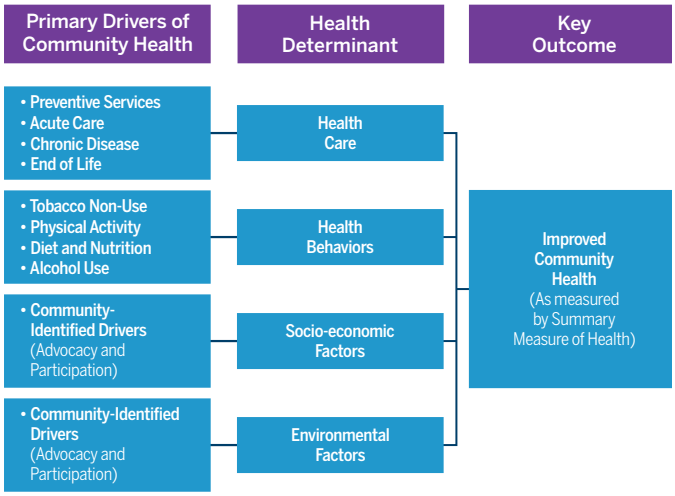
Figure 1 Population Health Model



Source: Adapted from County Health Rankings, 2014. Available online at **http://www.countyhealthrankings.org/our-approach**

Figure 2 below presents an alternative perspective of the primary drivers of community health and measures of their determinants, including health behaviors (e.g., tobacco use) and healthcare (e.g., delivery of acute care and preventive or primary care services).[22]

Figure 2 Framework for Improved Community Health



Source: Adapted from HealthPartners' *Health Driver Analysis for Priority Setting*. Isham Presentation, July 30, 2014.

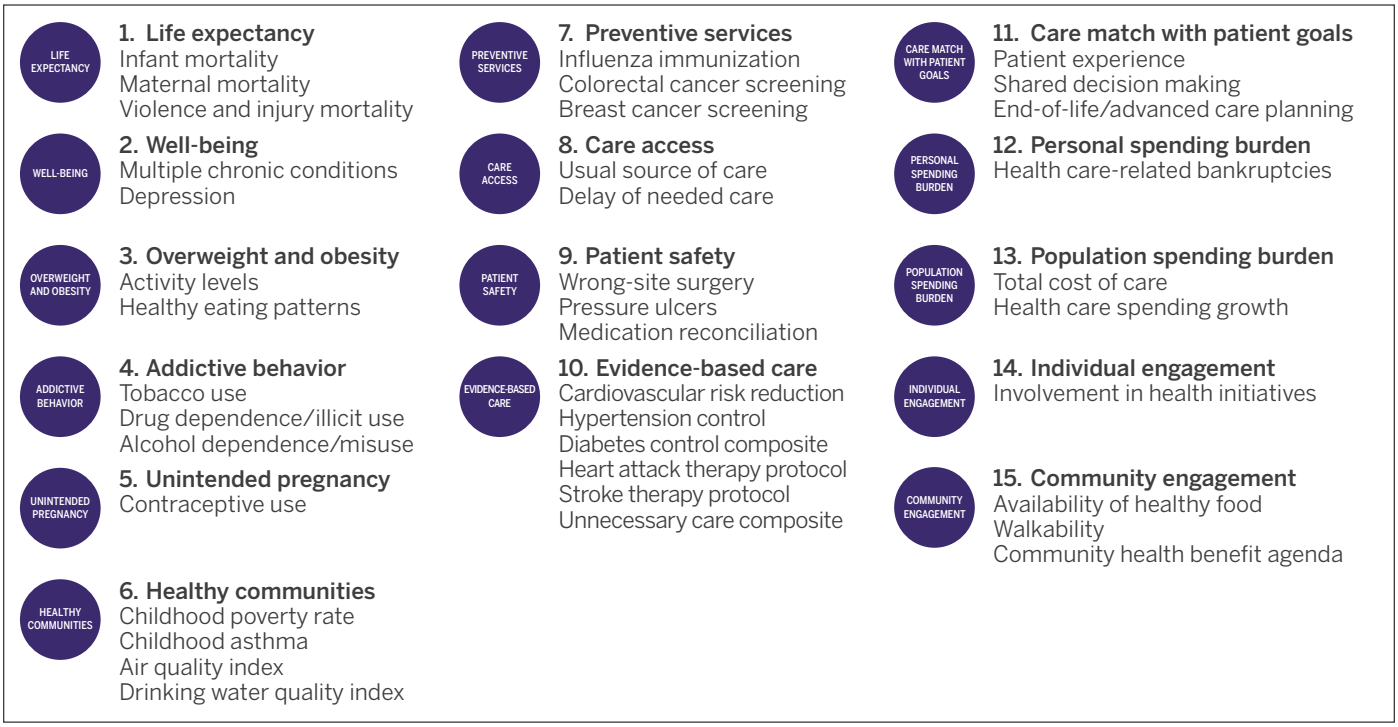
20 For example, Colorado proposes to develop a specific set of metrics that can be developed from readily available datasets. See, e.g., Pathy, Vatsala. "Main SIM Presentation," *SIM Colorado*. Colorado Office of the Governor, 16 November 2014, p. 15: **https://drive.google.com/file/d/0BxUiTIOwSb-PURFV6TTNMMGN6Sk0/view?usp=sharing** and State of Colorado. "Colorado SIM Proposal — Project Narrative" (Revised 10-8-14). *SIM Colorado*. Colorado Office of the Governor, 8 October 2014, p. 15: **https://drive.google.com/file/d/0B433IOgf8XV0MHZWY2hlNXFfN3M/view?usp=sharing**. In New York State's Delivery System Reform Incentive Payment (DSRIP) Program, the state identified core metrics for participating organizations to track as key performance and health status measures, including several we use in this study. We note that some of the metrics reported by the state are adjusted for demographic factors. See, e.g., **https://www.health.ny.gov/health_care/medicaid/redesign/dsrip/performance_data/**.

21 Graphic developed by County Health Rankings & Roadmaps: **http://www.countyhealthrankings.org/our-approach**

22 This diagram was adapted from a diagram reported as Figure 2 in Institute of Medicine's Roundtable on Population Health Improvement, "Business Engagement in Building Healthy Communities," Workshop summary.

The current focus on measurement and assessment has led to the development of thousands of different measures. While many of these measures are informative, the overall value they provide is mitigated by the lack of consistency between measures used by different organizations, as well as the sheer number of measures used in assessing health and healthcare. These issues of the plethora of measures, the lack of consistency in measurement and reporting, and the importance of focus on core metrics were addressed in a recent report released by the Institute of Medicine (IOM).[23] The report identifies 15 core measures intended to reflect key measures of the health of individuals and the performance of certain segments of the healthcare delivery system; these are grouped into four domains: Healthy People, Care Quality, Care Cost, and Engaged People.[24] While the measures, presented in **Figure 3** below, are identified as important and relevant factors for population level health, the report does not advocate for a specific set of metrics to be used to measure each of the 15 identified core measures nor does it set specific targets, although it does provide some examples of aspirational national measures. Instead the report focuses on each as priority areas for further work and implementation by a variety of different groups of stakeholders, including community level stakeholders.[25]

Figure 3 IOM Core Measures



Source: Adapted from the Institute of Medicine (IOM), 2015, *Vital Signs: Core metrics for health and health care progress.* Washington, D.C.: The National Academies Press.

The leading indicators developed in this report, as well as the detailed analyses of supply, costs, and utilization, span many of the specific categories and the core measures identified in the IOM report. We have undertaken every effort to develop measures that reflect the local or regional areas under consideration, and to make them useful for assessing healthcare and health behaviors, as well as to form a basis for expansion of analyses into broader areas. While social and environmental factors can have a significant impact on health outcomes and are relevant for achieving change, this report focuses more specifically on factors relating to health behaviors and clinical care. We do so because the primary objective of this report is to assess robustly certain segments of the local healthcare delivery system, including healthcare provider supply and to identify health priorities (and in a later phase of this project, to identify interventions likely able to effect meaningful change).

The core set of leading indicators or metrics provided in this report allows stakeholders to assess the Nashville region and to compare it with peer MSAs and national performance and to refine comparisons to take factors such as age, education, gender, income, and race into account, where possible. These leading indicators are developed to provide insights into key conditions and drivers in the five broad categories we find useful for stakeholders: **risk factors** (obesity, physical activity, smoking prevalence,

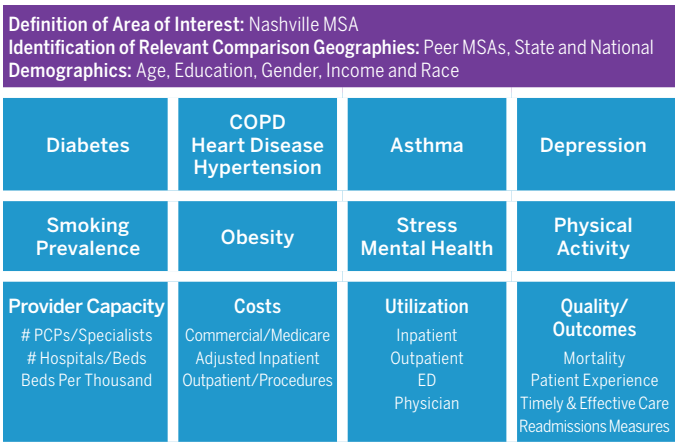
23 Institute of Medicine, 2015, *Vital signs: Core metrics for health and health care progress*, Washington, D.C.: The National Academies Press.

24 Measures within each domain include: *Healthy people*: Life expectancy, well-being, overweight and obesity, addictive behavior, unintended pregnancy, healthy communities; *Care quality*: Preventive services, care access, patient safety, evidence-based care, care match with patient goals; *Care cost*: Personal spending burden, sustainability; *Engaged people*: Individual engagement, community engagement.

25 The report contains the Best Current Measure for each of the 15 core measures, but many of these measures are available only at the state level or rely on data that have no standardized collection process or may not be collected regularly. See Institute of Medicine (IOM), 2015, *Vital signs: Core metrics for health and health care progress*, Washington, D.C.: The National Academies Press, pp. 4-3 and 4-5.

mental health) and **chronic conditions** (diabetes, COPD/heart disease/hypertension, asthma, depression);[26] **provider capacity** (number of primary care providers (PCP), specialists, hospitals, capacity); **costs** (commercial and Medicare for a range of services); **utilization of services** (by chronic condition and generally); and **hospital quality/outcomes** (mortality, readmissions, quality of care).[27]

Figure 4 The Nashville Metropolitan Statistical Area and Core Metrics (Leading Indicators)



This analysis was conducted using the most recent data available.[28] We use ***publicly available*** data that are reliable and can be used to construct MSA-level estimates for the population level health, access, parts of healthcare utilization and costs, and the quality of care analyses, including:

- Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS) survey data, which provide information on health behaviors and conditions for adults age 18 and older.
- The National Plan & Provider Enumeration System's (NPPES) National Provider Identification (NPI) dataset, which provides physician counts both in aggregate and by specialty.
- The Health Resources and Services Administration's Area Health Resources File database, which provides information on health factors and healthcare delivery.
- The Centers for Medicare & Medicaid Services' (CMS) Geographic Variation and Public Use File, which provides information concerning the distribution of Medicare beneficiaries, costs, and healthcare utilization.

We also rely on ***proprietary commercial claims*** data to explore utilization, costs, and chronic condition prevalence among the commercially insured. Although data on every commercially insured individual in Nashville and each peer MSA are not available, we use the most comprehensive data source available. This extensive database contains detailed cost information, including both insurer and patient payments for the commercially insured population – an important set of residents often left out of comparative scorecards or rankings due to lack of data. The data we use allow us to classify utilization by location of service (inpatient, doctor's office, other outpatient facility, etc.) and identify treatment (utilization) patterns by patient segment.

While some other reports present metrics at the county level and some at the state level, we use MSAs in this study. MSAs are increasingly used for comparison purposes in healthcare and for a wide variety of demographic, economic, and other data. They represent effective units of analysis because they correspond to areas that regional planning authorities oversee and reflect interconnectedness that exists among communities located in metropolitan areas. MSAs also allow for the use of reliable data consistently measured across all geographies reviewed in this report.

The following provides a detailed road map for the analyses in the next sections and briefly summarizes the strengths and weaknesses identified in the Nashville region. The complete analysis and full discussion of findings are contained in the relevant sections of this report.

Population Level Health (Section IV): Comparative health analyses start with an assessment of the health status of the population, which commonly is measured by metrics that capture incidences of disease or prevalence of behavioral risk factors (e.g., heart attack, obesity, smoking, or a low level of physical activity). These measures provide some basis for comparison across regions and frequently form the foundation for scorecards.[29] Community-level health priorities often are identified based on the findings presented in scorecards or rankings, which compare a given region with others. These comparative health statistics, however, are not able to disentangle the effect of health behaviors and health system performance from the effect of population diversity. Accordingly, these scorecards or rankings may not enable the user to identify actionable items.

In assessing population level health, this report compares Nashville with a 10 MSA peer group and calculates measures for nine categories (asthma, diabetes, heart attack, COPD, obesity,

26 The specific choice of chronic conditions may vary for a community; in the case of the Nashville region, we were asked to focus on these specific conditions for the pilot study.

27 Aspirational targets or goals are important steps in a second phase of analysis for areas of concern or intervention; these may be based on national or best-in-class measures or top percentile performers; different approaches may be chosen for different areas of concern.

28 In many instances, the most recent data available are for 2012. The lag between when data are collected and when they are released and available for analysis is due to the time required to prepare and carefully vet the data for accuracy.

29 For more information, see The Commonwealth Fund (**http://www.commonwealthfund.org/**) and University of Wisconsin County Health Rankings (**http://www.countyhealthrankings.org/**).

smoking, physical activity, depression, and high stress).[30] In calculating these measures, we take the extra step of accounting for the role demographics may play in explaining the collective health status of a given population. The resulting healthcare measures we incorporate in our analysis intrinsically adjust for population diversity, illuminating interesting differences when compared against the original metrics based on the unadjusted population.

Identifying health priorities in a community is a subjective endeavor, and classifying a health issue as a priority will depend on whether prevalence is assessed in comparison with benchmarks (i.e., national averages) or by actual prevalence with a goal of reaching as close to a predetermined value as possible. In the latter case, comparative health rankings may provide limited value. However, if distance from baselines and benchmarks is used to help identify critical areas of need requiring intervention, then adjusting comparisons so they are not skewed by differences in the underlying population will aid in making informed decisions on where and which specific interventions will have the most impact. Health factors or metrics where the region's score is deemed to be too high or too low after the population adjustment may identify those areas where intervention is most needed.

Based on initial comparisons of data on the leading indicators, there are six factors — heart attack, COPD, obesity, smoking, physical activity, and high stress — where Nashville ranks poorly compared with most of the 10 other MSAs.[31] Even after developing a comparison population to control for certain characteristics and making relevant sample population adjustments, smoking, COPD prevalence, heart attack, obesity, and physical activity remain areas where Nashville ranks poorly. These five areas likely warrant further attention as they highlight health factors where local performance is below average in comparison with the peer group even after accounting for diversity.

Chronic Conditions (Section V): Chronic conditions are key drivers in healthcare costs. Understanding costs and utilization for these conditions is essential in the effort to bend the healthcare cost curve. To assess the full range of cost associated with four chronic conditions (asthma, COPD, depression, and diabetes) among the commercially insured, we evaluate healthcare utilization patterns and expenditures for commercially insured individuals identified with the condition based on a review of the claims data. We calculate patient-level statistics for these four chronic conditions to evaluate and compare how the associated effect of a disease may vary between Nashville and the peer MSAs.[32]

We evaluate healthcare utilization by setting of care, frequency of visits, and cost (both to the insurer and to the patient). This information is helpful in identifying not only the financial burden related to patients with each condition but the indirect costs and potential effect on productivity as represented by time spent receiving care (i.e., hospitalizations and doctor office visits). In comparing Nashville with the peer MSAs, we find that treatment costs are lower, while utilization tends to be higher than in many of the peer MSAs.

We identify several patterns from our analysis of the Nashville population and compare the burden associated with each disease. Among all four conditions, patients with depression have the greatest number of doctor office visits, with an average of over 16.[33] This number of outpatient visits represents approximately four full work days spent receiving care if each outpatient visit is conservatively estimated as one that requires two hours of time (including roundtrip transportation). In terms of inpatient hospitalization, patients with COPD exhibit a high hospitalization rate, at 27%. This is twice the rate of patients with asthma or diabetes. A more complete understanding of the cost and resource intensity associated with certain diseases will help in evaluating the readiness of the healthcare system to treat these patients. It also will capture the broader cost associated with disease and paint a clearer picture of overall effect. Our analysis provides some perspective on the labor market (productivity) implications of disease, which may be useful in prioritizing health promotion efforts. For example, employers and community leaders may note the high healthcare utilization and related productivity losses associated with depression and undertake efforts to better address mental health in the workplace and community.

Healthcare Access and Physician Supply (Section VI): Sufficient access to healthcare is among the most important indicators of a community's potential to provide timely, effective, and appropriate care to its residents. Access is multi-dimensional and includes insurance coverage and supply factors (including both the number and mix of providers).[34] This report examines insurance coverage rates, physician supply both

30 We use poor mental health as a proxy for stress. Our measure of poor mental health was derived from the CDC's BRFSS survey question asking: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 was your mental health not good?" Poor mental health is defined as reporting problems with stress, depression, or emotion on at least 14 of the previous 30 days. Fourteen or more days is the cutoff point commonly used to identify frequent mental distress. See Borawski, E., Wu, G., and Jia, H., Substance Abuse and Mental Health Services Administration, Centers for Disease Control and Prevention self-reported frequent mental distress among adults – United States, 1993-1996. MMWR, 1998, 47: 325-331, **http://www.cdc.gov/mmwr/PDF/wk/mm4716.pdf**.

31 A poor ranking is identified as a rank of 7 or more where a rank of 6 identifies the midpoint of the sample.

32 While complete data on the full population are preferable, they are not available. Therefore, we use commercial claims data on a sample of the population in Nashville and the peer MSAs. Although the commercial claims sample we use in our analysis is not nationally representative, it generally is thought to be largely representative of working age employees with commercial insurance. Although some degree of difference in utilization may be due to the unique characteristics of patients included in the sample geographic differences, differences also may arise as a result of treatment patterns that vary both within and across regions.

33 Outpatient visits are not condition specific and include all visits, both related to the disease and otherwise, that the individual incurs over the course of a year. For all outpatient visits (which in addition to doctor office visits and ER visits includes services received in a hospital outpatient facility or other outpatient settings such as an outpatient surgery center), the average total outpatient visit count is 20. COPD is associated with the largest number of total average outpatient visits, with an average of 22 visits.

34 Another dimension addressed in the healthcare literature is the availability of relevant data and information for consumers, insurers, and providers to make better informed choices or to facilitate care.

in aggregate and by specialty, and physician growth rates over time. These metrics are provided for Nashville and are presented in comparison with the MSA peer group. Healthcare is dynamic, and the focus on preventive care is becoming more pronounced. This requires that healthcare delivery also be viewed at the micro level by looking at the number of physicians instead of relying solely on hospital factors as a measure of the ability to provide healthcare services. Our findings show that in evaluating healthcare access and physician supply, Nashville compares favorably against the peer MSAs previously outlined.

The Nashville MSA has a relatively high insurance coverage rate, with only 16% of the population uninsured. It ranks third best among the peer group for health insurance coverage[35] and has a higher rate of coverage compared with the national and Tennessee state averages. Residents in Nashville exhibit a high rate of connectivity with the healthcare system; 75% of residents reported having had a visit with a primary care provider within the past year. The relatively high coverage rate is complemented by the strong supply of physicians. In population adjusted terms, Nashville has more physicians than any of the MSAs in the peer group, outside of Denver and Indianapolis. Despite a relatively low number of primary care physicians in the Nashville region, the high number of internal medicine specialists moderates any negative effect, as they likely fill the role of a primary care physician for the population they serve.[36]

The region also has been successful in attracting and/or retaining physicians. Since 2000, physician supply in Nashville has grown more quickly than in many of the peer MSAs; only Denver and Indianapolis meet or exceed Nashville's physician growth rate. These findings indicate that Nashville is well-placed to meet the healthcare needs of the community. The high insurance coverage rate, coupled with the strong supply of physicians, suggests that there may be many opportunities for physician engagement. If each visit is thought of as an occasion to connect with patients and better manage their health and care, substantial opportunity exists for physicians to lead health improvement efforts.

Healthcare Utilization and Cost (Sections VII and VIII): Healthcare utilization rates provide a measure both of consumption of healthcare resources and the level of connectivity that may exist between the general population and the healthcare system. We use commercial claims and Medicare data to analyze utilization and cost of care by setting for Nashville and the MSA peer group. The analysis demonstrates that Nashville's commercially insured sample population has relatively high healthcare utilization. Four percent of enrollees used inpatient services in 2012, while nearly 80% used outpatient services. These levels of healthcare utilization are above average when compared with the peer group. Despite above average utilization, average costs are relatively low. Nashville has some of the lowest average costs for inpatient, emergency, and outpatient care for commercially insured patients across the peer group.

Similar patterns emerge when examining utilization and cost among the Medicare beneficiary population. Here, Nashville again ranks high and is in the top half of the sample. However, Medicare beneficiary readmission rates in Nashville are the highest among the sampled MSAs. While inpatient utilization among Medicare beneficiaries in the Nashville MSA is high, utilization has declined over the past four years (outpatient has remained relatively constant). As with the commercially insured sample, average costs are relatively low. Since Medicare reimbursement rates account for geographic differences in the cost to provide care, the low average cost can be interpreted as an indicator of a lower average intensity of treatment.

Taken together, a plausible finding is that the relatively high utilization may be due, in part, to a greater number of individuals in poor health but also to a higher propensity to seek treatment among the population. Relatively high utilization may indicate that although individuals are well-connected with the healthcare system, opportunities for better management of care may exist.

Quality of Care (Section IX): High-quality healthcare is a key component in supporting a healthy community. Quality healthcare means that patients receive appropriate care that meets their needs and that leads to high levels of patient satisfaction. It also means that care is coordinated (i.e., patients have appropriate discharge instructions and a plan of care), which reduces the likelihood of readmission. To assess hospital quality in the Nashville and peer MSAs, we explored hospital quality using CMS' Hospital Compare measures.[37]

We use three composite Hospital Compare measures to assess hospital quality: Timely and Effective Care, Survey of Patients' Experience, and Outcome.[38] All three measures are composite measures that aggregate a number of individual measures. These measures demonstrate how well a hospital adheres to the best clinical practices, how satisfied patients are with the care they receive in the hospital, and how high-quality care during hospitalizations affect patients' survival and quality of life. For each care domain, the relative ranking across MSAs was computed by calculating the percentage of beds in the MSA

35 The health insurance coverage rates are for the age 64 and under population.

36 Petterson et al., Projecting U.S. Primary Care Physician Workforce Needs: 2010-2025, **http://www.annfammed.org/content/10/6/503.full.pdf**

37 Readmissions data are important factors in evaluating quality of care. One type of readmission analysis relies on "unplanned readmissions" and is constructed based on CMS guidelines, developed by the Yale-New Haven Health Services Corporation. An unplanned readmission is a hospital admission where a patient is admitted to a hospital up to 30 days after an initial qualifying admission, where the patient had not planned to go to the hospital again within that period. Another type of readmission information is provided on the New York State Department of Health website and includes potentially preventable readmissions and is calculated using a specific methodology, the Potentially Preventable Readmission software created by 3M Health Information Systems. An appropriate readmissions analysis requires extensive data that are available only from hospitals and were not available to us. For this reason, we do not include readmissions as a factor in our quality of care analyses.

38 These measures are based on Hospital Value-Based Purchasing data released by CMS.

that fall above or below the national average. Findings from the analysis demonstrate that hospital quality in Nashville is at or above the national average but, in some cases, falls below the peer group average. For Timely and Effective Care, Nashville outperforms both the national average and many of its peers. With respect to the Patient Satisfaction category, Nashville hospitals also perform well and rank second among its peers in this care category. In the Outcome domain, Nashville underperforms compared with its peers. However, the Outcome measure should be interpreted with some caution as it is influenced by patient mix.

III. Overview of Nashville and Its Peer MSAs

The analyses presented in this study are based on development of comprehensive and robust data for Nashville and a peer group of 10 designated peer Metropolitan Statistical Areas.[39] These are MSAs that Nashville has used in comparative analysis for other purposes, including in the 2014 "Vital Signs" report:

- Atlanta-Sandy Springs-Roswell, GA
- Austin-Round Rock, TX
- Charlotte-Concord-Gastonia, NC-SC
- Denver-Aurora-Lakewood, CO
- Indianapolis-Carmel-Anderson, IN
- Kansas City, MO-KS
- Louisville/Jefferson County, KY-IN
- Memphis, TN-MS-AR
- Raleigh, NC
- Tampa-St. Petersburg-Clearwater, FL

There is significant economic and demographic diversity among the sample of peer MSAs. The Nashville MSA has a smaller population (approximately 1.6 million) than many of its peers. Median household income ranges from $44,402 to $61,453. Median household income is lower in Nashville ($51,500) than in many of its peers; only Louisville, Memphis, and Tampa have a lower median household income. Racial composition of the population also varies; the percent of the population that identifies as non-Hispanic white ranges from 46% to 79%. Percent of population, age 25 and above, with a college degree ranges from 26% to 42%. The Nashville MSA has 24 hospitals and the highest per capita hospital bed capacity of the MSAs (3.0 beds per 1,000 people). Summary statistics for each MSA are presented in **Table 1** and **Table 2** below. **Figure 5** is a map with these MSAs.

Table 1 Overview Demographics of All 11 MSAs

MSA	Population	Total Households	Female (%)	Age Under 18 (%)	Age 18-64 (%)	Median Income	Bachelor's Degree, Age 25+ (%)
National	314,112,078	115,226,802	51%	24%	63%	$53,046	28%
Atlanta	5,436,602	1,901,344	51%	26%	65%	$54,628	35%
Austin	1,835,110	648,412	50%	25%	67%	$59,433	40%
Charlotte	1,829,608	669,127	51%	26%	64%	$52,470	33%
Denver	2,646,694	1,000,849	50%	25%	65%	$61,453	39%
Indianapolis	1,798,896	673,718	51%	26%	63%	$51,808	31%
Kansas City	2,064,525	796,175	51%	26%	62%	$54,519	33%
Louisville	1,301,271	506,076	51%	24%	63%	$48,895	26%
Memphis	1,332,026	480,924	52%	27%	63%	$45,687	26%
Nashville	1,644,700	609,254	51%	24%	65%	$51,500	31%
Raleigh	1,188,504	425,166	51%	26%	65%	$60,319	42%
Tampa	2,845,178	1,121,530	52%	21%	62%	$44,402	26%

Source: U.S. Census Bureau, American Community Survey Five-Year Estimates and American Hospital Association's 2013 Survey Database (for bed count and hospital count)

Table 2 Overview Demographics of All 11 MSAs (Continued)

MSA	Non-Hispanic White (%)	Black (%)	Hispanic (%)	Married (%)	Total Hospital Beds	Total Hospitals	Beds per 1,000 People
National	71%	12%	12%	49%	750,865	4,527	2.39
Atlanta	51%	32%	10%	49%	8,990	38	1.65
Austin	55%	7%	31%	47%	2,677	19	1.46
Charlotte	61%	23%	10%	49%	3,588	11	1.96
Denver	66%	5%	22%	48%	4,360	16	1.65
Indianapolis	75%	15%	6%	49%	5,091	21	2.83
Kansas City	74%	12%	8%	49%	5,366	31	2.60
Louisville	79%	13%	4%	48%	3,338	17	2.57
Memphis	46%	45%	5%	43%	3,704	13	2.78
Nashville	74%	15%	7%	50%	4,938	24	3.00
Raleigh	63%	20%	10%	53%	1,835	6	1.54
Tampa	67%	11%	16%	45%	8,289	29	2.91

Source: U.S. Census Bureau, American Community Survey Five-Year Estimates and American Hospital Association's 2013 Survey Database (for bed count and hospital count)

39 Metropolitan Statistical Areas are delineated by the U.S. Census Bureau and are updated periodically. In our analysis, we use the 2009 delineations and use metro MSAs, which are areas with larger urban cores. The census creates metropolitan areas as a way to analyze a set of counties that has a "high degree of social-economic integration with the core [a densely settled concentration of population, consisting of an urbanized area of 50,000 or more population] as measured through commuting ties with the counties containing the core." See **http://www.whitehouse.gov/sites/default/files/omb/assets/fedreg_2010/06282010_metro_standards-Complete.pdf**, p. 37251. Thus, metropolitan areas are designed to include the counties that have economic involvement with the urban core area of a specific county.

Figure 5 The Nashville Metropolitan Statistical Area and Its Peer Group

There are 13 counties in the Nashville MSA, all of which are located in Tennessee. These counties are Cannon, Cheatham, Davidson, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson, and Wilson, and are outlined in **Appendix Figure 1**.[40]

We present a detailed analysis of health and healthcare in the Nashville region, with the intent of identifying areas where there is the potential for improvement. The analysis begins with an overview of population level health. We then focus on a subset of chronic conditions to assess the full cost associated with each condition. To better understand the connectivity between residents and the healthcare delivery system in the Nashville region, we then analyze access. We follow up this analysis with an assessment of utilization and cost for both the commercially insured and the Medicare population (separately). We conclude our analysis by assessing hospital quality in the Nashville region.

40 The analysis relies on 2009 MSA delineations. As such, Maury County is not included in the Nashville MSA.

IV. Population Level Health Analysis

A healthy community and workforce are critical components in achieving economic growth. Healthy individuals have a higher quality of life and are more productive than their less healthy counterparts. Illness is linked not only to productivity loss in the form of absenteeism and presenteeism but to increased health-care costs. Given the importance of population level health, communities often wonder how they compare with other areas. Answering this question helps identify the key areas of need in the community and represents the first step in developing opportunities for improvement.

Comparative health analyses are based on an assessment of the health of a population, measured by metrics that capture incidence of disease and/or prevalence of behavioral risk factors (e.g., heart attack, obesity, smoking, or a low level of physical activity). These measures, either alone or collectively as a composite, are used in developing scorecards.[41] However, rankings may provide only limited value. A community's score or ranking may not present an accurate comparison of the effectiveness of regional health policy because population diversity will affect outcome measures. These comparative health statistics presented in scorecards and rankings are not able to disentangle the effect of certain health behaviors and health system performance from the effect of population diversity. Accordingly, these rankings may not enable the user to identify actionable items.

This section of the report compares Nashville with the 10 MSA peer group and calculates prevalence measures across nine categories: asthma, diabetes, heart attack, COPD, obesity, smoking, physical activity, depression, and high stress. These reflect health conditions and health behaviors. In calculating these measures, we account for the role that demographic factors such as race, age, gender, income, and education may play in explaining the collective health status of a given population. Our methodology uses a matching algorithm to construct synthetic populations representing each comparison community. We follow an approach used in policy analysis to identify a control group (a subsample of the peer MSA's population) that is similar in characteristics to the population of interest: Nashville.[42]

Our analysis of health and health behavior data gives rise to several observations:

- Adjusting the comparison areas' population to account for demographic differences has an impact on Nashville's relative rank.[43] Rankings in three of nine categories improve after the adjustment.
- Nashville ranks toward the bottom half (worse) of the 10 MSA peer group for prevalence of heart attack, COPD, smoking, obesity, and low physical activity, both pre- and post-adjustment. These are areas that warrant further attention as performance is below average in comparison to the peer group, even when accounting for population diversity.
- The proportion of residents that report high stress or depression places Nashville at the mid-point of the scale both before and after the sample population adjustment. These are categories that may warrant further attention as additional areas for improvement.

Health metrics for Nashville and each peer MSA are presented in **Table 3** below. Based on the unadjusted rates,[44] Nashville has several health categories where they perform poorly relative to their peer group. COPD, cardiovascular health (captured by heart attack prevalence), obesity, physical activity, and smoking all are categories where Nashville ranks below the peer group average.

Table 3 MSA-Level Health and Health Behaviors (Unadjusted), 2012

	MEDICAL BEHAVIORS						HEALTH BEHAVIORS		
MSA	Asthma	COPD	Diabetes	Depression	Heart Attack	Obesity	High Stress	Physically Active	Smoking
National Avg.	13.0%	5.6%	9.7%	16.0%	3.9%	26.4%	15.3%	77.5%	17.4%
Atlanta	13.1%	5.2%	8.8%	14.6%	3.7%	26.6%	13.2%	80.9%	17.4%
Austin	12.5%	4.1%	7.4%	15.7%	2.1%	25.6%	10.8%	80.5%	15.3%
Charlotte	11.4%	6.5%	10.0%	14.7%	3.8%	28.0%	13.7%	78.8%	18.7%
Denver	13.6%	4.5%	7.4%	17.4%	2.9%	20.2%	13.9%	82.9%	18.0%
Indianapolis	13.8%	7.0%	9.8%	19.6%	4.2%	30.1%	18.3%	75.8%	22.0%
Kansas City	13.7%	7.4%	10.4%	16.7%	3.9%	28.3%	13.3%	79.5%	22.1%
Louisville	16.5%	10.9%	10.1%	22.3%	5.9%	31.9%	21.4%	73.6%	26.0%
Memphis	12.2%	5.2%	14.3%	19.1%	4.0%	35.4%	12.7%	71.9%	23.3%
Nashville	10.2%	7.1%	9.4%	16.6%	5.2%	29.3%	13.7%	74.3%	23.7%
Raleigh	11.1%	4.8%	8.1%	15.2%	2.7%	24.4%	11.3%	80.2%	16.5%
Tampa	12.0%	7.0%	11.7%	16.8%	5.9%	25.4%	19.7%	75.4%	20.1%

Source: Authors' calculations using The Centers for Disease Control and Prevention, BRFSS SMART Data, 2012

41 For example, see The Commonwealth Fund (**http://www.commonwealthfund.org/**) and University of Wisconsin County Health Rankings (**http://www.countyhealthrankings.org/**).

42 In effect, we employ the first stage of propensity score matching, a statistical technique commonly applied in economics.

43 Our adjustment process does not affect the actual rates in Nashville. We developed comparable populations in each of the peer MSAs. The rates among this comparable sample are referred to as the adjusted rates.

44 Unadjusted rates reflect the actual rates in Nashville and all peer MSAs. Our methodology allows us to create sample populations in each of the MSAs that are more similar in demographics to Nashville. Post adjustment, the population in each peer MSA is changed to more closely match the demographic makeup observed in Nashville. Post-adjustment changes in rankings of peer MSAs should not be interpreted as providing meaningful information regarding peer MSAs.

A. Methodology for Developing Comparison Populations

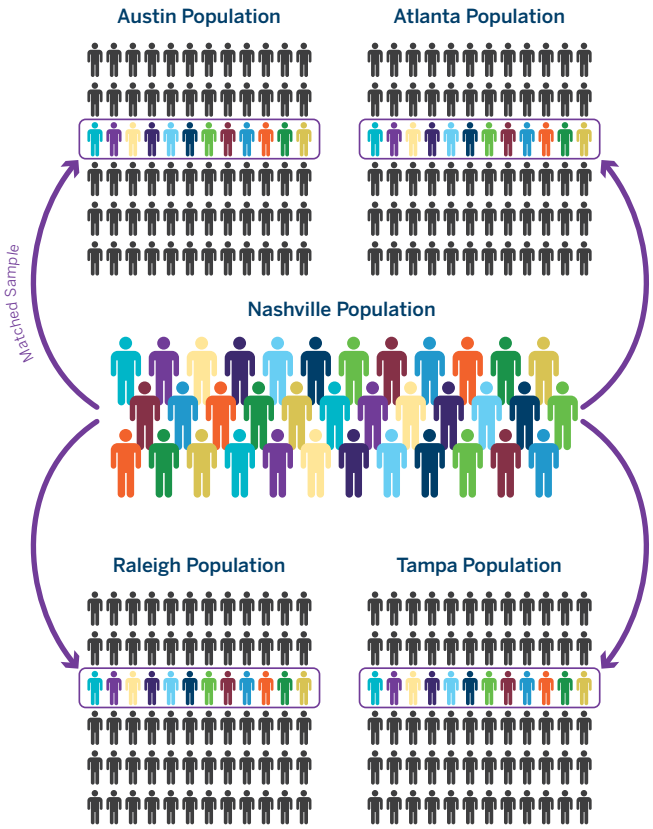
The sample is constructed to take into account the effect that demographic diversity can have on the comparison of health metrics across disparate populations. For example, prevalence rates of certain diseases vary by race. This complicates comparison of heart disease prevalence, for example, across communities with different demographic makeup. This raises the question: Are different observed rates due to differences in health behavior and/or healthcare or primarily due to differences in the demographic makeup of a community?[45] Although actual unadjusted metrics provide accurate prevalence rates, they may not be best suited for across-area comparisons. Our matching approach allows us to hold constant demographics across communities and provide, in effect, demographic-adjusted metrics. Factors that remain outliers, even after adjustment, represent potential health priorities and areas where improvement is likely most actionable.

In conducting our analysis, we use data collected by the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System. The Selected Metropolitan/Micropolitan Area Risk Trends (SMART) survey data from BRFSS provides information on health behaviors and conditions for adults age 18 and older and provides reliable data that can be used to construct MSA-level estimates.[46]

Sample populations in each peer group MSA are identified using a matching algorithm. The matching algorithm is based on the following demographic and economic variables: race, employment status, income,[47] education, age, and gender. For each individual in the Nashville sample, the sample populations of each peer MSA are searched to locate the closest match, the person most similar to the Nashville individual in terms of the demographic and economic variables outlined above. Once all matches are complete, we run a series of tests to ensure that the matched and control sample are statistically significantly similar.[48]

Figure 6 conceptualizes how each individual in Nashville is matched with a similar individual in the comparison communities.

Figure 6 Population Matching



In conducting our analysis, we use data collected by the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System. The SMART survey data from BRFSS provides information on health behaviors and conditions for adults age 18 and older and provides reliable data that can be used to construct MSA-level estimates.[49]

We present pre- and post-adjustment rankings for the series of health and health behavior metrics in **Table 4** on the next page. There are two ranking columns for each condition, one that demonstrates the pre-adjusted ranking and the second that shows the post-adjustment ranking. Adjusting for demographic differences across MSAs has an effect on the MSA's relative rankings. Based on initial rankings, there are six factors (heart attack, COPD, obesity, smoking, physical activity, and high stress) where Nashville ranks poorly compared with the peer group; e.g., below the mid-point.[50] While rankings in three categories improve after adjustment, smoking, COPD, heart attack, obesity, and physical activity remain as areas where Nashville ranks poorly. The rank of these five health metrics, post-adjustment, indicates that these areas likely warrant further attention as high-priority areas. We note further that for other factors

45 The National Quality Forum (NQF) originally advised in 2006 that while the effect of socio-economic factors on health is well-known, quality measures should not be adjusted for these factors. Accordingly, CMS and others have adopted a no adjustment policy. However, due to concerns that failing to adjust for socio-demographic factors can lead to unfair comparisons between hospitals and healthcare providers on certain metrics, the NQF has revised the policy and, in July 2014, began a testing and endorsement phase for socio-democratic adjusted quality factors for specific factors. For more information, see Kevin Fiscella, Helen Burstin, and David Nerenz, "Quality Measures and Sociodemographic Risk Factors: To Adjust or Not to Adjust" *JAMA*, 2014 December, 312(24), 2615-2616, and "**Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors**," National Quality Forum, 2014 August. 1-97. See also Paul Hershberger and Dean Bricker, "Who Determines Physician Effectiveness" *JAMA*, 2014 December, 312(24): 2613-2614.

46 For more information of the BRFSS data, see: **http://www.cdc.gov/brfss/smart/smart_data.htm**.

47 The income measure is a flag indicating whether the individual has an income of less than $10,000. This level was chosen to approximate the poverty level; higher income levels were not used as they are more likely to capture differences in cost of living across different geographic areas.

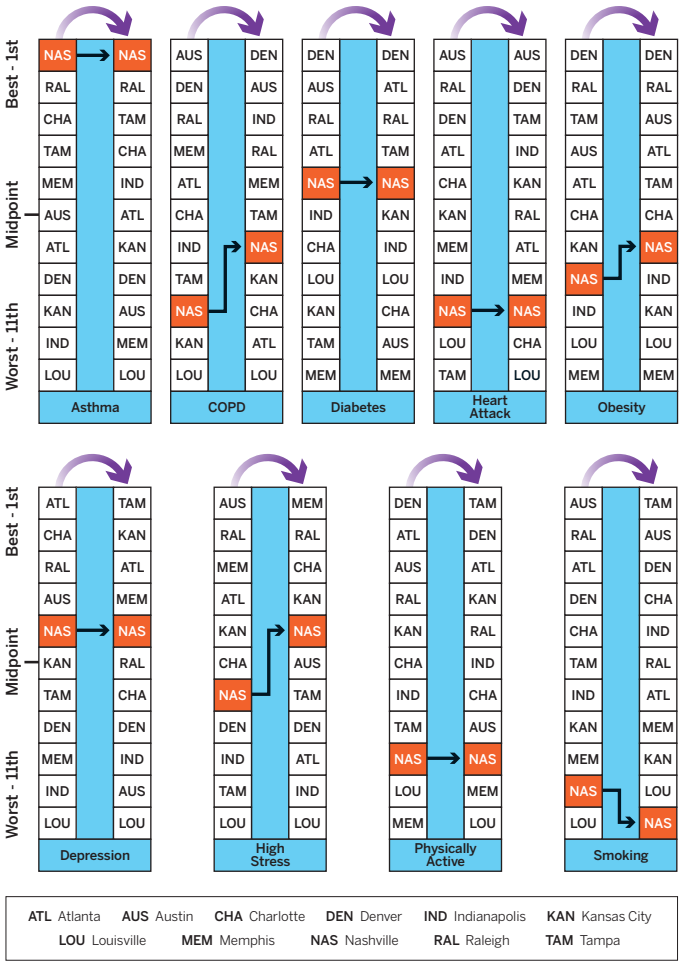
48 See Appendix Figure 13 and Appendix Figure 14 that compare MSA-level averages for a selection of demographic factors pre- and post-adjustment.

49 For more information of the BRFSS data, see: **http://www.cdc.gov/brfss/smart/smart_data.htm**.

50 A poor ranking is identified as a rank of 7 or more where a rank of 6 identifies the midpoint of the sample.

(e.g., depression, stress, and diabetes), Nashville ranks around the middle of its peer group on a population-adjusted basis.

Table 4 MSA-Level Health and Disease Behavior Rankings



Source: Authors' calculations using the Centers for Disease Control and Prevention, BRFSS SMART Data, 2012

This change in rankings resulting from the demographic-adjustment process we employ indicates that the sample composition has a meaningful impact on observed prevalence. While COPD and obesity rates were relatively high in Nashville using the raw sample, the adjusted sample indicates that Nashville's rates are closer to average among the sample. The same is true with stress; Nashville is originally ranked seventh, and is fifth post-adjustment.

These results highlight the fact that unadjusted rankings may not be well-suited to compare the health or healthcare system performance of a particular area, because the ranking reflects not just the effect of regional public health policy but is strongly influenced by the demographic makeup of the population. Accounting for demographic differences is important in identifying actionable items – measures, items, and areas a community has the potential to change. Adjusting for demographic differences removes the effect of the population composition so that more equitable comparisons are possible. If a community finds that it trails its peers *even after* accounting for differences in demography — factors beyond their control — this may highlight areas where action is most needed.

V. Chronic Conditions Analysis

Chronic conditions are key drivers of healthcare costs. An essential part of the effort to bend the healthcare cost curve and to develop strategies to better manage care for patients with these conditions is understanding the costs and utilization associated with these conditions. In order to evaluate and assess empirically the full range of costs associated with the four specific chronic conditions identified for this pilot study as key priorities for study[51], we evaluate healthcare utilization patterns and expenditures for commercially insured individuals identified as having the condition based on a review of the claims data.[52] We use commercial claims data from 2011.[53] The statistics and analysis presented in this section are for the under age 65 commercially insured population. We calculate patient-level statistics for the four chronic conditions to evaluate and compare how the associated disease impact may vary between Nashville and the peer MSAs. Although some degree of difference may be due to the unique characteristics of patients included in the sample,[54] geographic differences are expected as treatment patterns vary both within and across regions.

We evaluate healthcare utilization by setting of care, frequency of visits, and cost (both to the insurer and to the patient as reflected in payments). This information is helpful in identifying not only the direct financial burden related to patients with each condition but the indirect cost and potential impact on productivity as represented by time spent receiving care (i.e., hospitalizations and doctor visits). Our analysis reveals several interesting findings:

- In Nashville, the average costs of treatments are below average, while utilization rates are above average when compared with the peer MSAs.
- Among all four analyzed conditions, patients with depression have the greatest number of outpatient visits, with an average of 16.[55] This number of outpatient visits represents approximately four full days spent receiving care.[56]
- In terms of inpatient hospitalization, patients with COPD exhibit a high hospitalization rate, at 24%. This is twice the rate of patients with asthma or diabetes.[57]

Further evaluation of the cost and resource intensity associated with chronic conditions presents a more comprehensive perspective on the overall effect of each of these chronic conditions. Analysis of time involved in obtaining patient care and frequency of services supplements statistics on cost and utilization to provide some perspective on the labor market (productivity) implications of disease. The findings may be useful in prioritizing health promotion efforts. For example, employers may be interested in noting the high utilization and related productivity losses associated with depression and undertake efforts to better address mental health and develop strategies to better support the health needs of employees with this condition.

The analyses in this section are based on the commercial claims data for the Nashville area and for the peer group MSAs. The estimated prevalence rates (as calculated using claims data) for each of these chronic conditions are based on these data. Many reported statistics on these chronic conditions use population-level averages, which include all populations and differ from the estimated prevalence rates from the commercial claims data. These data sources, however, do not provide the opportunity to develop the more extensive utilization and cost analyses that we develop here using the commercial claims data.

For convenience and comparison with our analyses, we present actual prevalence rates for the entire population on the next page in **Table 5.** Differences are due both to the difference in sample populations and the disease identification methodology employed. Prevalence rates will be lower than the actual rates in a given area. The commercially insured population is expected to be healthier than the general population as the former is younger (age 64 and under) – disease rates increase with age; thus, a younger population, all things equal, should be healthier. The methodology we employ to identify disease is based on diagnosis codes. If an individual visits a healthcare provider but the diagnosis code for an existing condition is not recorded, we are unable to identify that individual as having that condition. However, exploring healthcare utilization behavior of the commercial sample is informative, particularly of service utilization and cost, and is an empirically sound basis for comparison across MSAs.[58]

51 Patients are identified as having a specific chronic condition based on a set of rules that relies on diagnosis codes in insurance claims. Our approach does not capture all individuals in the sample with a condition because there may be individuals previously diagnosed who did not seek care during the period under review. Therefore, the prevalence rates presented should be interpreted as lower limits. For more information regarding the methodology, see the Appendix.

52 Many patients with chronic conditions have co-morbidities; thus, it is not possible to identify utilization or cost as the direct result of a specific condition. Utilization and expenditure measures presented in this report relate to all healthcare services consumed by the individual in the given time period.

53 While we use data from 2012 throughout the report, we rely on data from 2011 for this section due to the methodology used to identify individuals with chronic conditions. See Appendix Section D.2 for more information. Our analysis in this section is based on the commercially insured population. Additional analysis could involve comparable analyses of chronic condition prevalence among the Medicare beneficiary population.

54 Although the commercial claims sample used in this analysis is not nationally representative, it is thought to be largely representative of working age employees with commercial insurance.

55 These outpatient visits are for care rendered in a doctor's office or emergency room only. For all outpatient visits (which includes services received in a hospital outpatient facility or other outpatient settings, in addition to doctor office visits and ER visits), the average total outpatient visit count is 20.

56 Time spent for a visit varies by location, type of care, and time of day. The two-hour estimate was based on the 30-minute target office visit length per the Institute of Healthcare Information. (**http://www.ihi.org/resources/Pages/Measures/OfficeVisitCycleTime.aspx**). Wait time varies significantly. In a study by Anderson and Feldman (2007), they note that based on data analyzed as part of a pilot program, 70% of patients waited less than 15 minutes to see a doctor. However, in their study reviewing patient satisfaction, they find that 25% of respondents reported waiting more than 30 minutes to be seen. See Anderson, R., Feldman, Barbara, "What patient's want: a content analysis of key qualities that influence patient satisfaction" (March 2007), 55:61, *Journal of Medical Practice Management* (**http://www.ncbi.nlm.nih.gov/pubmed/17494478**). In a study conducted by Washington state, they found that the average patient travels 17.5 minutes for routine primary care but is willing to travel up to 30 minutes roundtrip (**http://www.ofm.wa.gov/researchbriefs/2013/brief070.pdf**).

57 Chronic condition classification is not mutually exclusive. Patients identified as having a certain chronic condition may have other chronic conditions as well.

58 The statistics we present in this chronic conditions analysis may be somewhat skewed toward less healthy individuals (poor health would increase the likelihood of an interaction with a healthcare provider and increase the probability that a diagnosis code indicating a specific disease is recorded), but this should not affect across-area comparisons because all MSA-level statistics were calculated using the same approach.

Table 5 Population Level Disease Prevalence by MSA, 2012

MSA	Asthma	COPD	Depression	Diabetes
National Avg.	13.0%	5.6%	16.0%	9.7%
Atlanta	13.1%	5.2%	14.6%	8.8%
Austin	12.5%	4.1%	15.7%	7.4%
Charlotte	11.4%	6.5%	14.7%	10.0%
Denver	13.6%	4.5%	17.4%	7.4%
Indianapolis	13.8%	7.0%	19.6%	9.8%
Kansas City	13.7%	7.4%	16.7%	10.4%
Louisville	16.5%	10.9%	22.3%	10.1%
Memphis	12.2%	5.2%	19.1%	14.3%
Nashville	10.2%	7.1%	16.6%	9.4%
Raleigh	11.1%	4.8%	15.2%	8.1%
Tampa	12.0%	7.0%	16.8%	11.7%

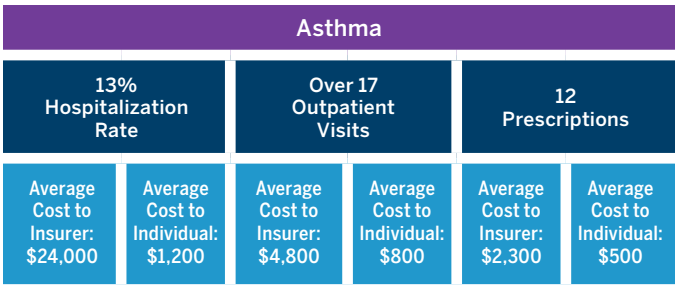
Source: Authors' calculations using the Centers for Disease Control and Prevention, BRFSS SMART Data 2012

Each of the following sections provides a comprehensive evaluation of the specific chronic condition and its associated medical costs and healthcare utilization for the commercially insured population in Nashville.

A. Asthma

Figure 7 presents the estimated medical costs and healthcare utilization associated with the asthmatic population in Nashville.[59] The diagram shows that persons suffering from asthma, on average, have more than 17 outpatient visits[60] per year and a 13% rate of inpatient admissions.[61] Despite the high number of outpatient visits, the financial burden associated with patients who suffer from asthma is lower than for patients identified as having the other chronic conditions analyzed in this report. On average, insurers pay a total of $24,000 for inpatient services and $4,800 for outpatient visits, while the average individual incurs total costs of $1,200 for hospitalization and $800 for all outpatient visits.[62,63]

Figure 7 Utilization and Costs Associated with Asthma in the Nashville MSA



Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

Table 6 on the next page provides summary statistics comparing the Nashville MSA with its peer group MSAs and reports total average payment and utilization statistics for individuals with asthma by MSA.

Nashville has the lowest prevalence[64] of asthma when compared with all 10 peer group MSAs in the commercial claims data.[65] The average cost per patient in Nashville is approximately $400 more than the national average.[66] This finding may be due, in part, to the fact that although Nashville patients had average inpatient utilization levels, they had relatively higher outpatient utilization (emergency department (ED) and office visits).

59 The asthmatic population is identified using commercial claims data.

60 Outpatient visit counts presented in Figures 7-10 refer to all outpatient visits, which includes services received in a hospital outpatient facility or other outpatient settings, in addition to doctor's office visits and ER visits.

61 As patients may have more than one chronic condition and because patients with a specific chronic condition may seek care for an ailment unrelated to their chronic condition, utilization and cost measures apply to patients' healthcare utilization in general and are not specific to treatment for a given condition.

62 These costs are averages for the subsample of patients that had claims in a specific category. For example, the average cost to the insurer of $24,000 for a hospital visit is the average cost among the 13% of the population that had an inpatient visit during the time period under review.

63 These statistics provide an estimate of potentially avoidable healthcare costs and productivity losses related to depression. These estimates provide a reference point that can be used to assess possible savings, which may be achieved through interventions that lower overall prevalence.

64 Prevalence number is low (1.8%) compared with nationally reported statistics. It is important to note that the data are based on a sample of the commercially insured population. The commercially insured population is skewed toward a younger, healthier demographic in comparison with the overall population.

65 In our analyses using commercial claims data, we assume that the sample is representative of the commercially insured population and that each MSA sample is directly comparable with other MSA samples.

66 Total payments are for all visits and procedures incurred during the year. It was not possible to identify cost specifically related to the treatment of a specific condition as claims data do not contain the level of detail necessary to make that determination. Total payments represent payments by the insurer plus payment made by the individual.

Table 6 Asthma Average Per Patient Statistics by MSA, 2011

MSA	Prevalence	Total Payment	Net Payment	Coinsurance	Copay	Deductible	Inpatient Visit Count	ED Visit Count	ED Visit Count All	Office Visit Count	Office Visit Count All	ED + Office Total Visit Count
National Avg.	3.0%	$8,808	$7,758	$320	$221	$282	1.4	1.9	0.6	13.2	13.0	13.6
Atlanta	2.8%	$8,695	$7,570	$355	$246	$357	1.4	1.8	0.5	12.9	12.8	13.3
Austin	2.9%	$9,822	$8,254	$395	$252	$375	1.4	1.9	0.5	14.3	13.8	14.3
Charlotte	2.0%	$9,643	$8,442	$463	$249	$329	1.4	1.9	0.5	14.2	14.1	14.6
Denver	3.0%	$8,705	$7,553	$410	$248	$357	1.3	1.8	0.5	12.7	12.5	13.1
Indianapolis	3.1%	$10,231	$9,012	$463	$170	$433	1.4	1.9	0.6	12.2	12.1	12.7
Kansas City	2.7%	$8,413	$7,357	$400	$205	$328	1.4	2.0	0.7	12.4	12.2	12.9
Louisville	3.2%	$7,400	$5,962	$360	$261	$419	1.5	1.8	0.6	16.3	16.2	16.8
Memphis	2.4%	$7,649	$6,551	$352	$273	$226	1.4	2.0	0.6	12.6	12.4	13.1
Nashville	1.8%	$9,235	$7,982	$382	$305	$314	1.4	2.0	0.7	13.9	13.8	14.5
Raleigh	2.2%	$7,636	$6,696	$362	$245	$244	1.3	1.9	0.5	12.7	12.6	13.2
Tampa	3.2%	$8,780	$7,760	$358	$241	$278	1.4	1.8	0.5	13.0	12.9	13.4

Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

While healthcare utilization is costly in financial terms, it also represents potential productivity loss. We make this observation and estimate the time involved with obtaining care and note that some of this time potentially is avoidable where a reduction in the incidence of the chronic condition could reduce the need for healthcare service utilization.[67] For individuals with the disease, office visits and other care can represent necessary treatment to improve health.

In **Table 6** above, utilization is disaggregated by setting of care. ED Visit Count and Office Visit Count represent the average number of visits per patient, for each patient identified as having the condition, and who had at least one of these respective visits in 2011. ED Visit Count All and Office Visit Count All are the average number of visits per patient for all patients with asthma.[68] The values presented in the table demonstrate that Nashville has higher than average outpatient utilization for asthma.[69] The potential productivity cost that results for doctor office visits that likely require time away from work is not trivial. If each office visit is conservatively estimated as requiring two hours of time (including roundtrip transportation), the sample asthma population spends more than three full eight-hour work days at a doctor's office each year.[70]

B. Chronic Obstructive Pulmonary Disease

Figure 8 presents the medical costs and healthcare utilization associated with the COPD population in Nashville. The data analyses and the diagram show that patients with COPD have a high average number of outpatient visits per year (more than 22) and a very high rate of inpatient admissions, at 27% of the population. Patients with COPD account for the highest cost among the four conditions analyzed. With an average total inpatient hospitalization cost of $32,000,[71] the high hospitalization rate can be interpreted as an indication that total expenditures for this disease population are high.

67 More extensive studies in the wellness literature evaluate the expected gains from interventions, including the reduction in medical costs and improvement in wellness or quality of life for the individual, as well as estimates of the productivity gains. For a comprehensive assessment of this literature, see, World Economic Forum (2013), *The Workplace Wellness Alliance — Making the Right Investment: Employee Health and the Power of Metrics in Collaboration with FTI Consulting*. See **http://www.weforum.org/reports/workplace-wellness-alliance-making-right-investment-employee-health-and-power-metrics**.

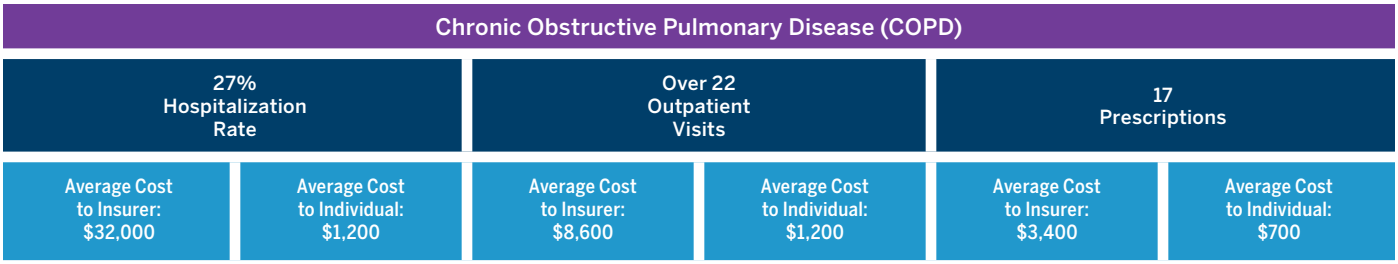
68 Because the denominator for each of these calculations is the same, total outpatient visits can be calculated as the sum of these two statistics. These utilization variables — ED Count, ED Count All, Office Visit Count, and Office Visit Count All — are calculated using the same methodology for all chronic conditions. Outpatient Visit Count is the sum of ED Visit Count All and Office Visit Count All. Due to small differences in rounding, the two columns (ED Visit Count All and Office Visit Count All) may not sum directly to the value presented in Outpatient Visit Count.

69 Outpatient Visit Count is the sum of ED Visit Count All and Office Visit Count All. Due to small differences in rounding, the two columns (ED Visit Count All and Office Visit Count All) may not sum directly to the value presented in Outpatient Visit Count.

70 We assume that employees visit a doctor during working hours. However, many individuals work atypical hours, and some doctors offer evening or weekend care. To the extent that employees are able to schedule a doctor's visit outside of working hours, the time spent would account to a loss of leisure time.

71 These costs are averages for the subsample of patients who had a claim in a specific category; e.g., average cost to the insurer of $32,000 for a hospital visit is the average cost among the 27% of the population that had an inpatient visit during the time period.

Figure 8 Utilization and Costs Associated with COPD in the Nashville MSA



Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

Table 7 shows total average financial and utilization statistics, by MSA for the peer group of MSAs and Nashville, for individuals with COPD. The table illustrates the variability in total number of office and emergency room visits for COPD patients, ranging from a low of 13 visits per year (Indianapolis) to a high of about 16 visits per year (Atlanta). Nashville has higher office utilization with approximately one additional office visit per patient relative to the national average. Despite Nashville's higher utilization, seven MSAs have higher average total cost. Per patient total costs for Nashville are below the average of the 10 other MSAs by more than $500; total average out-of-pocket expenditures are in line with the other MSAs. The potential productivity loss related to office visits, estimated as requiring two hours of time with roundtrip transportation, amounts to 30 hours of time away from work. This equates to spending almost four full eight-hour work days at a doctor's office each year.

Table 7 COPD Average per Patient Statistics by MSA, 2011

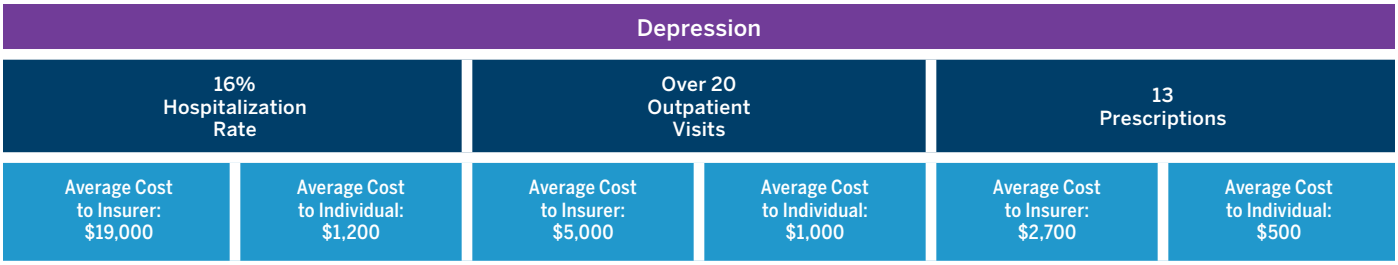
MSA	Prevalence	Total Payment	Net Payment	Coinsurance	Copay	Deductible	Inpatient Visit Count	ED Visit Count	ED Visit Count All	Office Visit Count	Office Visit Count All	ED + Office Total Visit Count
National Avg.	1.0%	$18,912	$16,832	$534	$284	$371	1.6	2.2	0.8	13.9	13.7	14.5
Atlanta	0.7%	$21,688	$19,059	$680	$346	$493	1.6	2.3	0.8	15.3	15.1	15.9
Austin	0.5%	$21,729	$18,707	$652	$317	$526	1.7	2.2	0.7	14.5	14.0	14.8
Charlotte	0.6%	$21,104	$18,961	$792	$322	$408	1.6	2.4	0.8	14.0	13.8	14.6
Denver	0.5%	$26,012	$23,280	$845	$337	$484	1.5	1.9	0.6	14.1	13.7	14.3
Indianapolis	1.1%	$22,609	$20,273	$706	$248	$465	1.6	2.1	0.8	12.1	11.9	12.8
Kansas City	0.8%	$22,326	$20,164	$704	$271	$383	1.7	2.3	0.9	13.3	13.2	14.1
Louisville	1.9%	$13,566	$11,249	$487	$308	$450	1.6	2.0	0.6	14.4	14.3	14.9
Memphis	1.0%	$18,317	$16,281	$708	$345	$347	1.6	2.1	0.7	13.6	13.5	14.2
Nashville	0.8%	$19,828	$17,168	$643	$402	$438	1.6	2.2	0.9	15.0	14.9	15.8
Raleigh	0.4%	$15,524	$13,943	$611	$313	$319	1.5	2.2	0.7	14.0	14.0	14.7
Tampa	1.3%	$21,232	$19,251	$624	$307	$362	1.6	2.0	0.7	15.1	14.9	15.6

Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

C. Depression

Figure 9 presents the medical costs and healthcare utilization associated with the population in Nashville that suffers from depression. The diagram shows that, on average, depression is associated with over 20 outpatient visits per year, more than any other chronic condition analyzed. On average, insurers pay a total of $19,000[72] for inpatient services and $5,000 for outpatient visits, while the individual incurs total costs of $1,200 for hospitalization and $1,000 for all outpatient visits.

Figure 9 Utilization and Costs Associated with Depression in the Nashville MSA



Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

Table 8 below summarizes total average financial and treatment statistics for the peer group of MSAs and Nashville, by MSA, for individuals with depression. For patients in Nashville with depression, the medical costs incurred are toward the lower end of the spectrum with regard to the conditions we analyze and are low in comparison with the peer group average for patients with depression. The total cost per patient in Nashville is approximately $1,600 less than the national average. Inpatient and emergency department utilization is in line with other peer MSAs. Nashville's doctor's office and emergency room utilization (16.9 visits per year) is lower than the national average (17.6 visits per year), and relative to its MSA peer group, Nashville is in line with the group average. However, the potential productivity cost associated with patients with depression is higher than that for any other condition we analyze, as measured by number of doctor office visits. If each outpatient visit is estimated as requiring two hours of time (including roundtrip transportation), the population that suffers from depression spends more than four full eight-hour work days at a doctor's office each year.

Table 8 Depression Average per Patient Statistics by MSA, 2011

MSA	Prevalence	Total Payment	Net Payment	Coinsurance	Copay	Deductible	Inpatient Visit Count	ED Visit Count	ED Visit Count All	Office Visit Count	Office Visit Count All	ED + Office Total Visit Count
National Avg.	4.1%	$11,230	$9,882	$422	$296	$339	1.5	2.1	0.6	17.2	17.0	17.6
Atlanta	3.4%	$10,285	$8,874	$481	$315	$422	1.5	1.9	0.5	17.0	16.9	17.4
Austin	3.8%	$10,072	$8,430	$452	$347	$417	1.5	2.0	0.5	18.2	17.5	18.0
Charlotte	2.9%	$11,026	$9,576	$525	$301	$357	1.5	2.1	0.5	16.3	16.2	16.8
Denver	3.7%	$12,660	$11,045	$542	$331	$413	1.4	2.0	0.6	17.2	17.0	17.5
Indianapolis	4.4%	$12,804	$11,176	$541	$208	$461	1.5	1.9	0.6	14.2	14.0	14.6
Kansas City	3.6%	$11,541	$10,208	$481	$257	$377	1.6	2.2	0.7	15.8	15.8	16.5
Louisville	4.0%	$8,861	$7,434	$408	$293	$434	1.6	2.0	0.6	14.7	14.6	15.2
Memphis	2.7%	$9,595	$8,278	$445	$407	$292	1.4	1.9	0.5	16.3	16.2	16.7
Nashville	3.8%	$9,635	$8,017	$422	$391	$338	1.5	2.1	0.6	16.4	16.3	16.9
Raleigh	3.1%	$10,601	$9,091	$479	$347	$313	1.4	2.0	0.4	19.2	19.1	19.5
Tampa	3.8%	$11,670	$10,383	$448	$288	$344	1.5	1.9	0.5	15.9	15.8	16.4

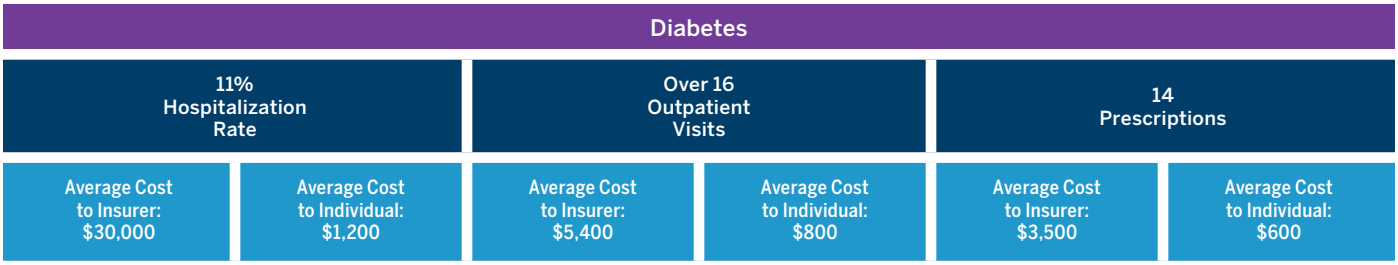
Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

72 These costs are averages for the subsample of patients who had a claim in a specific category; e.g., average cost to the insurer of $19,000 for a hospital visit is the average cost among the 16% of the population that had an inpatient visit during the time period.

D. Diabetes

Figure 10 presents the medical costs and healthcare utilization associated with the diabetic population in Nashville. The diagram shows that patients having diabetes have an average of more than 16 outpatient visits per year and an 11% rate of inpatient admissions. Inpatient services for this patient population cost insurers an average of $30,000 per patient while outpatient services result in an additional $5,400 in costs.[73]

Figure 10 Utilization and Costs Associated with Diabetes in the Nashville MSA



Source: Authors' calculations Using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

Table 9 provides financial and utilization statistics for individuals with diabetes, by MSA, for the peer group of MSAs and Nashville. Average total costs are somewhat higher in Nashville compared with many of the peer MSA's average total payments. However, total average out-of-pocket expenditures in Nashville are in line with comparable MSAs' out-of-pocket costs. Nashville's diabetes utilization statistics follow similar trends to those for asthma – inpatient utilization is approximately the same, but Nashville has doctor's office and emergency room utilization that is toward the high end of the range. Nashville's 11.8 visits per patient are among the greatest in the analyzed sample. When compared with the national average (11.5 visits per year), Nashville experiences slightly more visits per diabetic patient. However, the overall range in doctor's office and emergency room utilization in narrow compared with other chronic conditions analyzed. The potential productivity loss related to office visits amounts to approximately 23 hours of time away from work. This equates to spending just under three full eight-hour work days at a doctor's office each year.

Table 9 Diabetes Average per Patient Statistics by MSA, 2011

MSA	Prevalence	Total Payment	Net Payment	Coinsurance	Copay	Deductible	Inpatient Visit Count	ED Visit Count	ED Visit Count All	Office Visit Count	Office Visit Count All	ED + Office Total Visit Count
National Avg.	5.2%	$10,513	$9,145	$358	$208	$311	1.5	1.8	0.4	11.2	11.1	11.5
Atlanta	5.4%	$10,037	$8,694	$373	$230	$368	1.4	1.7	0.4	11.1	11.0	11.4
Austin	4.3%	$9,941	$8,024	$396	$229	$351	1.5	1.8	0.4	11.3	10.6	11.0
Charlotte	4.3%	$11,382	$9,854	$471	$227	$322	1.5	1.9	0.4	11.0	11.0	11.3
Denver	3.0%	$10,778	$9,280	$472	$228	$375	1.4	1.6	0.3	10.9	10.7	11.0
Indianapolis	5.0%	$11,930	$10,444	$449	$178	$417	1.5	1.7	0.4	9.8	9.6	10.0
Kansas City	4.4%	$10,460	$9,273	$380	$177	$348	1.5	1.9	0.5	10.3	10.2	10.7
Louisville	5.9%	$8,268	$6,809	$323	$232	$370	1.5	1.7	0.4	11.3	11.2	11.5
Memphis	6.1%	$9,747	$8,347	$508	$248	$288	1.4	1.7	0.4	10.4	10.3	10.7
Nashville	5.6%	$10,346	$8,630	$351	$285	$318	1.5	1.9	0.4	11.5	11.4	11.8
Raleigh	4.1%	$10,182	$8,889	$403	$231	$257	1.3	1.8	0.3	11.4	11.3	11.6
Tampa	5.7%	$10,892	$9,738	$362	$217	$290	1.5	1.8	0.4	11.5	11.4	11.7

Source: Authors' calculations using Truven Inpatient Services, Outpatient Services, and Annual Enrollment Files, 2012

73 These costs are averages for the subsample of patients who had a claim in a specific category; e.g. average cost to the insurer of $30,000 for a hospital visit is the average cost among the 11% of the population that had an inpatient visit during the time period.

VI. Access

In this section, we evaluate healthcare access by analyzing health insurance coverage rates, primary care usage, physician supply, and hospital supply. While insurance coverage is positively associated with utilization, adequate physician supply ensures that patients can be treated appropriately and in a timely manner.

A. Insurance Coverage

Health insurance coverage rates can be interpreted as a measure of potential connectedness between the population and the healthcare system. Insured individuals are more likely than those not insured to receive primary care and to seek treatment for illness in a timely manner. Individuals without health insurance may delay or forgo needed care, potentially resulting in costly acute care as their condition worsens. Findings from the 2008 Oregon Medicaid Health Experiment, for example, found that individuals with health insurance use more preventive care, have less catastrophic medical expenditures, and have better self-reported health.[74]

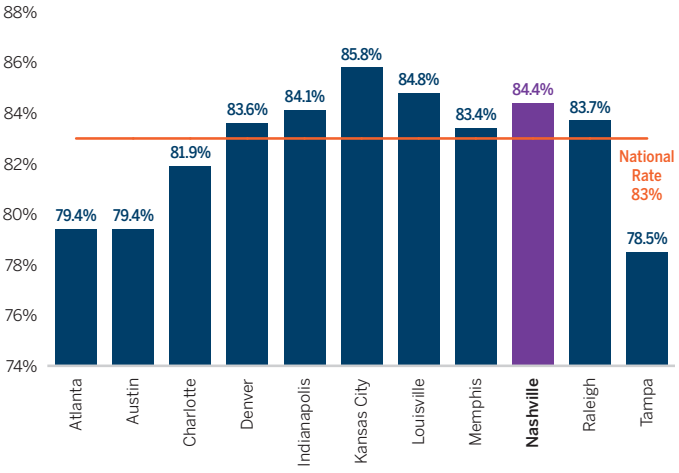
In 2012, 15.7% of the total population was covered by Medicare[75], and 83.0% of the national under age 65 population had health insurance.[76] In Tennessee, 17.4% of the total population was covered by Medicare; 83.8% of the under age 65 population had health insurance, and 18.7% of the total population was covered through Medicaid.[77] In the Nashville MSA, 13.5% of the total population had Medicare; 84.4% of the under age 65 population had health insurance and 15.1% of the total population had Medicaid.[78] Key findings from our analysis are presented below:

- Nashville ranks third best in health insurance coverage among its peer group.
- With 13.5% of the total population insured through Medicare, Nashville ranks below the national rate for Medicare.
- Primary care usage is high among residents in Nashville, with 75% of the population reporting a primary care visit within the past year.

Nashville ranks third in health insurance coverage in our MSA peer group with, 84.4% of the under age 65 population insured, as depicted in **Figure 11**. This rate exceeds both the national average and the average rate for the state of Tennessee. Nashville follows only Kansas City and Louisville which rank first and second, respectively. In addition, in 2012, 13.5% of the Nashville population was insured through Medicare as depicted in **Appendix Figure 15**. This is lower than the national rate. Less than half of the peer MSAs had a smaller population-adjusted share of Medicare beneficiaries. As coverage is dependent on age, the variation reflects the different age distribution in each MSA.

A higher insurance coverage rate suggests that a larger proportion of residents in a community may face less financial strain for costs due to a medical issue and that healthcare providers are better able to collect for the care they deliver.[79] Higher levels of insurance coverage suggests that, all else equal, systems that coordinate care or manage care by providers, by insurers or by both, may be easier to implement than in communities with lower coverage.

Figure 11 Health Insurance Coverage Rate as a Percent of Population under Age 65 across the 11 MSAs, 2012



Source: Authors' calculations using U.S. Census Bureau's Small Area Health Insurance Estimates

Primary care usage statistics presented below suggest residents in the Nashville region appear to have a higher rate of connectivity with the healthcare system than do residents in many peer MSAs. **Table 10** shows that three of every four residents in Nashville saw a primary care provider during the past year.

74 See Amy Finkelstein, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, Katherine Baicker, and the Oregon Health Study Group, **"The Oregon Health Insurance Experiment: Evidence from the First Year,"** *Quarterly Journal of Economics*, 2012 August, 127(3): 1057-1106; and Katherine Baicker, Sarah Taubman, Heidi Allen, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Eric Schneider, Bill Wright, Alan Zaslavsky, Amy Finkelstein, and the Oregon Health Study Group, **"The Oregon Experiment – Medicaid's Effects on Clinical Outcomes,"** *New England Journal of Medicine*, 2013 May; 368(18): 1713-1722.

75 Medicare coverage calculations are calculated using the Monthly Medicare State/County Penetration files at: **http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/MA-State-County-Penetration.html**. We calculate the population that has Medicare by dividing the average amount of eligibles in 2012 across the 12 months and then divide that number by the total 2012 population estimate.

76 The 83% coverage rate applies to insured persons, including Medicaid.

77 The Affordable Care Act has reduced the uninsured rate since implementation of exchanges in 2014. Therefore, our figures underestimate the percent insured. For estimates of insurance coverage in 2014 in Tennessee, see: Buntin, Melinda B., et al. (2015), Covering the Uninsured in Tennessee [PowerPoint slides]. Retrieved from Vanderbilt University Department of Health Policy website: **https://medschool.vanderbilt.edu/health-policy/**; presentation available at: **https://medschool.vanderbilt.edu/health-policy/files/health-policy/public_files/Nashville%20Community%20Forum%201-14-15%20new%20titles.pdf**.

78 Medicaid estimates are calculated by dividing the December 2012 TennCare county enrollment data by the 2012 population estimates. The county enrollment data can be found at: **http://www.tn.gov/tenncare/news-enrollmentdata.shtml#12**.

79 Uninsured often have difficulty paying medical bills, and these bills, which may be processed by collection companies, have a low probability of payment. Finkelstein et al., **"The Oregon Health Insurance Experiment: Evidence from the First Year,"** *Quarterly Journal of Economics*, 2012 August, 127(3): 1057-1106.

Table 10 Percentage of Population That Had a Primary Care Visit

MSA	Primary Care Visit (%)
National Average	67.7%
Atlanta	70.0%
Austin	61.9%
Charlotte	71.3%
Denver	61.2%
Indianapolis	65.8%
Kansas City	66.1%
Louisville	65.1%
Memphis	75.3%
Nashville	74.6%
Raleigh	72.8%
Tampa	70.0%

Source: Authors' calculations using the Centers for Disease Control and Prevention, BRFSS SMART Data, 2012

B. Physician Supply

The current shortage of primary care physicians and specialists in the United States is a cause for concern. The Association of American Medical Colleges projects there will be a deficit of 90,000 physicians at the end of 2020 unless supply increases significantly.[80] The shortage contributes to a lack of preventive care and inadequate management of chronic disease and exacerbates fragmented care delivery.

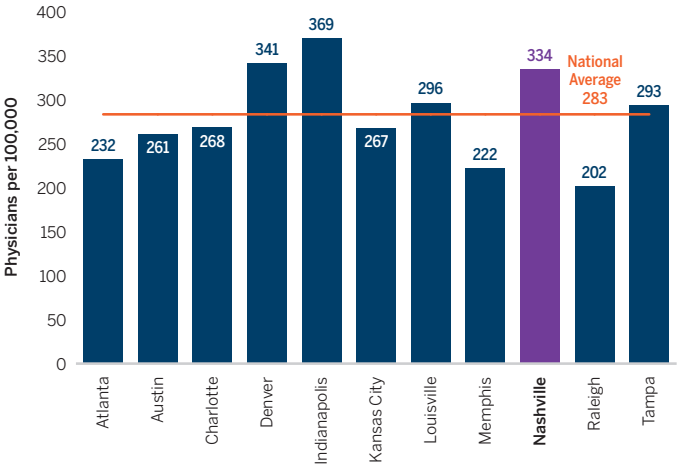
In analyzing physician supply data and information, we determined that some geographic areas have a lower supply of physicians than others. We use two main data sources in conducting this analysis: the National Provider Identification (NPI) dataset and the Health Resources and Services Administration's Area Health Resources File Database. The NPI was used to calculate per capita physician counts (both in aggregate and by specialty) for Nashville and its peer MSA group. Physician supply over time was calculated using the Health Resources and Services Administration's Area Health Resources File Database for 2013. Based on the data analyzed, we infer that the Nashville MSA has a relatively strong supply of physicians with above average growth:

- Compared with the national average, Nashville has a relatively high number of physicians per 100,000 residents. Within Nashville's peer group, only the Denver and Indianapolis MSAs have a greater supply of physicians.
- Nashville's supply of Family Medicine physicians is below average. Compared with its peer group, Nashville has significantly fewer Family Medicine physicians per 100,000 residents.
- Nashville has a strong supply of Internal Medicine physicians.
- From 2000 to 2012, the Nashville MSA has added 37 physicians per 100,000 people. This rate of growth is matched only by the Denver MSA (37 per 100,000) and the Indianapolis MSA (42 per 100,000). Memphis, a second MSA in Tennessee, grew by only 11 physicians per 100,000 over this same period.

1. Supply Analysis

Figure 12 shows that Nashville's supply of physicians per 100,000 residents is greater than the national average in the United States. The Nashville MSA has 334 physicians per 100,000, while the national average is 283. Compared with its peers, only the Indianapolis and Denver MSAs have a greater number of physicians per capita.

Figure 12 Physicians per 100,000 by Metropolitan Statistical Area, National and Peer Group Averages



Source: Authors' calculations using the Centers for Medicare & Medicaid Services' NPPES NPI Dataset, 2014 for physician count (numerator); 2010 Census population from the 2013 U.S. Census Bureau's Metropolitan/Micropolitan Statistical Area Population and Estimated Components of Change Data for population (denominator)

Due to the important role primary care physicians play in managing population health and in response to concerns regarding inadequate supply across communities throughout the United States, we analyzed two types of physician specialties that generally fill this role: Family Medicine and Internists.[81] While the aggregate physician supply in Nashville is strong, the supply of Family Medicine physicians is below average (see **Appendix Figure 16**). However, Nashville's supply of Internal Medicine physicians is above average, with 90 physicians per 100,000 residents (see **Appendix Figure 17**). Patients may respond to the lower supply of primary care doctors by visiting Internists rather than Family Medicine practitioners. If Internal Medicine physicians and Family Medicine physicians are categorized as primary care providers, Nashville has a supply of

80 Association of American Medical Colleges, Physician Shortages to Worsen Without Increases in Residency Training: **https://www.aamc.org/download/153160/data/physician_shortages_to_worsen_without_increases_in_residency_tr.pdf**. Accessed October 24, 2014.

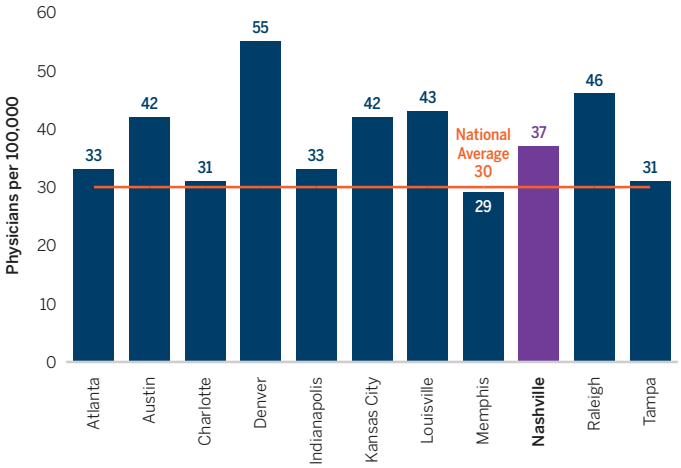
81 Internists regularly provide primary care. For example, see Petterson, Stephen, Winston Liaw, Robert Phillips, David Rabin, David Meyers, and Andrew Bazemore, *Projecting US Primary Care Physician Workforce Needs: 2005-2025*, Annals of Family Medicine, 2012, 10: 503-509.

114 primary care providers per 100,000. This is on par with the national average of 112 physicians per 100,000 (see **Appendix Figure 18**) and exceeds the aggregate supply of Internists and Family Medicine physicians of many of its peer MSAs.

Behavioral and mental health is an important aspect of community-based healthcare. It is estimated that some 18% of the U.S. population suffer from a diagnosable mental illness.[82] The social costs of behavioral health issues are numerous and include the cost of treatment and the cost associated with lost productivity. Integration of behavioral health services will help to achieve better outcomes, better patient experience, and a lower per capita healthcare cost.[83] For these reasons, it is important to understand a community's supply of physicians focusing on areas of practice that address behavioral and mental health issues.

The Nashville MSA has a slightly below average supply of physicians and professionals specializing in psychiatry and psychology[84] when compared with the peer group as shown in **Figure 13**. The Denver MSA has the greatest supply, with 55 psychiatrists and psychologists per 100,000 residents. In Nashville, there are 37 psychiatrists and psychologists per 100,000 residents.

Figure 13 Psychiatric Physicians per 100,000 by Metropolitan Statistical Area

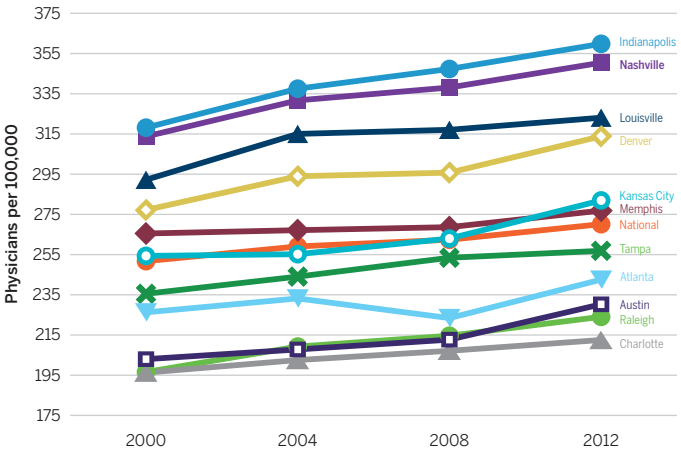


Source: Authors' calculations using the Centers for Medicare & Medicaid Services' NPPES NPI Dataset, 2014 for physician count (numerator); 2010 Census population from the 2013 U.S. Census Bureau's Metropolitan/Micropolitan Statistical Area Population and Estimated Components of Change Data for population (denominator)

2. Supply Over Time

Figure 14 presents the number of physicians per 100,000 by MSA from years 2000 through 2012.[85] Nashville's physician supply has remained the second highest in respect to its peer group over time. Variation in growth rates is apparent among the sample. For example, Charlotte and Raleigh had very similar population-adjusted supply in 2000. However, over time, Raleigh's supply of physicians per 100,000 increased at a rate that is greater than Charlotte's.

Figure 14 Supply Over Time, Nashville Metropolitan Statistical Area and Its Peer Group, 2000-2012



Source: Authors' calculations using the Health Resources and Services Administration's Area Health Resources File Database, 2013 for physician count; U.S. Census Bureau's U.S. Population Data, 2010 for population

Figure 15 illustrates the growth in physician supply occurring within the Nashville and peer MSAs and leads to several observations:

- From 2000 to 2012 there was significant growth in Nashville while in other areas, there has been relatively little growth, with less than one additional physician per 100,000 each year. In the Nashville MSA, there have been an additional 37 physicians per 100,000 added since 2000.
- This growth is on par with Denver (which grew at the same rate over the same period) and is outpaced only by Indianapolis, which grew by 42 physicians per 100,000 between 2000 and 2012.
- In the Memphis MSA there has been particularly slow growth, with only 11 physicians per 100,000 added over the 12-year period. Similarly, in the Charlotte and Atlanta MSAs, there have been 16 physicians per 100,000 added over 12 years.

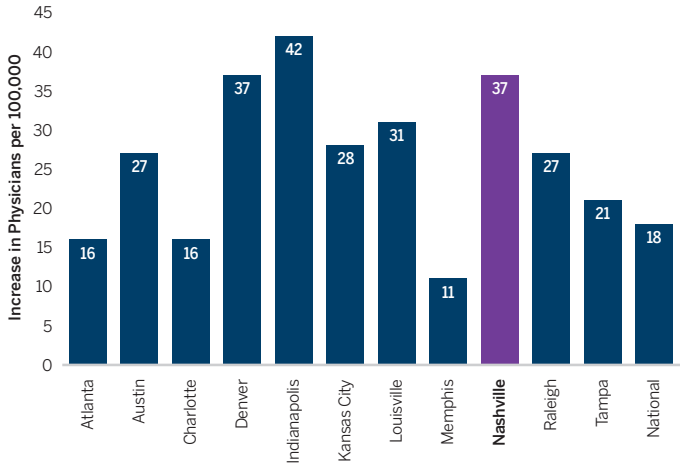
82 Institute for Healthcare Improvement, *Behavioral Health*: **http://www.ihi.org/Topics/BehavioralHealth/Pages/default.aspx**

83 Institute for Healthcare Improvement, Behavioral Health Integration: A Key Step Towards The Triple Aim: **http://www.ihi.org/education/WebTraining/Webinars/Web_Action/BehavioralHealthIntegration/Pages/default.aspx**.

84 The National Plan & Provider Enumeration System NPI dataset presents physician specialties for psychiatry and neurology as a combined category

85 2012 is the most current data available. Health Resources and Services Administration, Area Health Resources File Database, 2013: **http://ahrf.hrsa.gov/**.

Figure 15 Change Over Time — Increase in Physicians per 100,000 Supply Over Time, 2000-2012



Source: Authors' calculations using the Health Resources and Services Administration's Area Health Resources File Database, 2013 for physician count; U.S. Census Bureau's U.S. Population Data, 2010 for population

Table 11 Healthcare Provider Supply by Metropolitan Statistical Area, 2013

MSA	Census 2010 Population	General Acute Care Hospitals	Independent Competitors	Total Beds	Beds per 1,000 Residents	Major Teaching Hospitals	Minor Teaching Hospitals
Atlanta	5,439,950	38	17	8,990	1.65	5	11
Austin	1,834,303	19	8	2,450	1.46	1	0
Charlotte	1,831,084	11	4	3,588	1.96	1	1
Denver	2,645,209	16	7	4,360	1.65	2	5
Indianapolis	1,798,634	21	12	5,091	2.83	3	7
Kansas City	2,064,630	31	18	5,366	2.60	3	3
Louisville	1,301,116	17	10	3,338	2.57	1	1
Memphis	1,332,960	13	8	3,704	2.78	2	3
Nashville	1,644,703	24	10	4,938	3.00	1	13
Raleigh	1,188,564	6	5	1,835	1.54	0	0
Tampa	2,842,878	29	8	8,289	2.91	1	13

Source: Authors' calculations using the American Hospital Association's Hospital Survey Data, 2013

C. Healthcare Infrastructure: Hospital Supply

Hospitals and health systems represent an important part of the healthcare delivery system in a region. **Table 11** presents information on general acute care hospitals in Nashville and in the MSA peer group and provides details on total beds and beds per 1,000 residents.[86] Beds per 1,000 residents represent a measure of available capacity and potentially of excess capacity. A general acute hospital is defined as one whose primary services are general medical and surgical. The term independent competitor refers to individual health systems in an area; e.g., a given health system may have more than one hospital in an MSA. In addition, the table provides information on teaching hospitals. A Major Teaching Hospital is one with more than 100 full-time medical residents or interns. A Minor Teaching Hospital is any hospital with no more than 100 residents or interns.[87]

Compared with the MSA peer group, Nashville has the highest total beds per 1,000 residents, with 3.00 beds for every 1,000 residents. Many MSAs – Atlanta, Austin, Charlotte, Denver, and Raleigh — have fewer than two beds per 1,000 residents.

Nashville has an average number of independent health systems (10) compared with the peer group, with the number of independent health systems ranging from four (Charlotte) to 18 (Kansas City). Nashville has one hospital classified as a Major Teaching Hospital and 13 as Minor Teaching Hospitals.

86 The American Hospital Association, Annual Survey Database 2013. Hospitals owned or operated by the Air Force, Army, Navy, Veterans Affairs, and the Department of Justice are omitted from this table. Census data were used to generate population counts by MSA

87 The American Hospital Association, Annual Survey Database 2013.

VII. Healthcare Utilization and Payments: Commercially Insured

The following section presents information on healthcare utilization and cost in the Nashville region and the designated peer MSAs. We present the analysis separately for both a sample of commercially insured individuals and for all Medicare beneficiaries (in the following section). Comparing utilization and cost provides a reference point by which the affordability of healthcare can be measured and highlights the variation that exists in the consumption of healthcare resources. Information on utilization and cost per patient is presented by care setting (inpatient and outpatient) for the commercially insured population in this section, as well as for the Medicare population in Section VIII.

A. Commercially Insured Sample

Analysis of healthcare utilization and payments was conducted using a commercial claims database. Although data on every commercially insured individual would be preferable in conducting this analysis, they are not available. Therefore, we use the best, most comprehensive data source available. The database we use contains private sector health insurance information for approximately 45 million covered individuals nationwide (hereafter referred to as enrollees). This covers approximately 14% of the total U.S. population and more than 50% of all commercially insured individuals.[88] The full sample includes enrollees that may be either plan holders or their dependents that are covered through approximately 100 employer-sponsored plans. Information on payments and utilization is available by setting for services provided in any inpatient and outpatient hospital setting. Pharmaceutical drug claims information also is available. The data span calendar years 2010-2012.

B. Commercially Insured Sample: Utilization

Healthcare utilization varies widely across the United States. Variation may be due to the health of the underlying population, physician treatment patterns, or differences in coordination of care. We analyze healthcare service consumption in the Nashville region using data on a sample of commercially insured individuals (enrollees). Below we highlight some of the main findings:[89]

- Nashville's commercially insured sample population has relatively high utilization and ranks the third highest for use of any inpatient or outpatient service among the peer group.
- Nashville's sample population has a relatively high rate of hospitalizations (4.1%), which exceeds that of most of its peer MSAs.
- Relative to other peer MSAs, Nashville has a higher proportion of enrollees (77.6%) who visit a doctor's office in a given year.
- Patients in Nashville tend to visit a doctor more frequently than in the peer MSAs, an average of 6.7 times in 2012. Only Austin has a greater average frequency of visits (6.8 visits per patient).
- More than 12% of the commercially insured sample population in Nashville had at least one emergency department visit. Only three peer MSAs had higher rates of emergency department utilization: Kansas City (15.7%), Memphis (13.4%), and Louisville (13.0%).
- Nashville has a relatively low proportion of enrollees (1.1%) who visited the ED and did not visit a doctor's office at any point during the calendar year.

The findings are similar in many ways to the findings presented in Medicare population analysis in the next section. Among the Medicare population, inpatient service utilization also is high, although it has been decreasing in recent years. Similarly, ED utilization is high but has decreased since 2008.

To present an overview of commercially insured patient utilization, **Table 12** contains information on healthcare service use by MSA in 2012. The table presents the total number of enrollees, total number of visits, proportion of enrollees using healthcare services by MSA, and proportion of enrollees using any inpatient or outpatient service. The table shows that Nashville has the third highest proportion of enrollees (80%) using any inpatient or outpatient service and the fourth highest proportion of enrollees with a hospitalization (4.1%). In this case, relatively high utilization may mean that individuals are well-connected with the healthcare system and are appropriate consumers of preventive care. Alternatively, it could indicate that opportunities for better management of care exist. To ascertain whether utilization patterns suggest there may be some overutilization, more detailed analysis is needed. We explore utilization in greater detail in the following tables and graphs.

88 See Appendix Section B.2 for more details on sample coverage.

89 In performing the analysis, we assume that sample populations are representative of the underlying population. The commercial claims data are provided for a sample of individuals in each community. Differences in utilization may reflect the different composition of the sample as populations are heterogeneous (i.e., the sample population in one MSA may contain individuals that are sicker and, therefore, are higher consumers of healthcare services than in a more healthy comparison group).

Table 12 Commercially Insured Healthcare Service Utilization in Nashville and Peer MSAs in 2012

MSA	Total Enrollees	Total Receiving Services	Total Receiving Services (%)	Receiving Inpatient Services	Receiving Inpatient Services (%)	Receiving Outpatient Services	Receiving Outpatient Services (%)	OP Services Exclusively	OP Services Exclusively (%)
National Average*	51,944,763	40,082,931	77.2%	2,119,545	4.1%	40,064,939	77.1%	37,963,386	73.1%
Atlanta	1,357,387	1,063,593	78.4%	46,778	3.4%	1,063,202	78.3%	1,016,815	74.9%
Austin	424,715	325,927	76.7%	15,693	3.7%	325,804	76.7%	310,234	73.0%
Charlotte	363,327	293,952	80.9%	13,677	3.8%	293,867	80.9%	280,275	77.1%
Denver	365,126	278,506	76.3%	14,238	3.9%	278,409	76.3%	264,268	72.4%
Indianapolis	577,488	448,229	77.6%	21,377	3.7%	448,041	77.6%	426,852	73.9%
Kansas City	297,153	233,054	78.4%	14,902	5.0%	232,864	78.4%	218,152	73.4%
Louisville	290,866	227,354	78.2%	12,157	4.2%	227,250	78.1%	215,197	74.0%
Memphis	197,118	150,830	76.5%	8,177	4.1%	150,744	76.5%	142,653	72.4%
Nashville	310,832	247,774	79.7%	12,832	4.1%	247,715	79.7%	234,942	75.6%
Raleigh	168,119	136,714	81.3%	5,657	3.4%	136,676	81.3%	131,057	78.0%
Tampa	335,277	261,534	78.0%	15,441	4.6%	261,425	78.0%	246,093	73.4%

*Across all MSAs as proxy for national estimate
Source: Authors' calculations using Truven Inpatient Services and Outpatient Services Files — 2010, 2011, 2012

Table 13 contains information on doctor office visits by MSA in 2012.[90] The table presents information on the proportion of enrollees with a doctor office visit, the average number of visits for these patients, and the count of visits by type: primary care, specialty, and other. A greater proportion of enrollees in the Nashville MSA visited a doctor's office in 2012 compared with most of the peer MSAs, and Nashville patients tended to visit more often compared with the other MSAs. Enrollees in Nashville had an average of 6.7 visits per patient in 2012, which is greater than any other MSAs except Austin (which had 6.8 visits per patient).This is similarly reflected in the average number of office visits by physician type, which was consistently higher for each of the categories for patients in the Nashville area.

Table 13 Commercially Insured Enrollees with at Least One Doctor Office Visit by Physician Specialty in Nashville and Peer MSAs in 2012

MSA	At Least One Office Visit	Office Visit (%)	Total Office Visits	Average Visits	Average Visits Per Patient by Type[1]		
					Primary Care	Specialty	Other
National Average*	38,380,381	73.9%	255,333,985	6.7	2.5	2.1	2.7
Atlanta	1,027,483	75.7%	6,517,893	6.3	2.7	2.2	1.5
Austin	305,615	72.0%	2,065,111	6.8	2.7	2.1	2.5
Charlotte	286,847	79.0%	1,884,951	6.6	2.8	2.0	1.6
Denver	259,589	71.1%	1,597,820	6.2	2.4	1.7	2.0
Indianapolis	426,760	73.9%	2,506,323	5.9	2.4	1.7	1.6
Kansas City	221,223	74.4%	1,321,290	6.0	2.4	1.3	2.0
Louisville	217,884	74.9%	1,443,810	6.6	2.5	2.1	1.6
Nashville	241,203	77.6%	1,623,752	6.7	2.8	2.1	1.9
Memphis	144,608	73.4%	922,399	6.4	2.7	2.1	2.0
Raleigh	133,084	79.2%	886,215	6.7	2.7	1.8	1.9
Tampa	251,002	74.9%	1,655,386	6.6	2.4	2.1	1.8

*Across all MSAs as proxy for national estimate
[1] Average for patients with at least one visit
Source: Commercial Claims Outpatient Services File, 2012

The data presented in **Table 14** provides information on the proportion of enrollees visiting an emergency department at least once and the proportion of enrollees visiting an ED who did not visit a doctor's office at any point during the year. Lack of a primary care provider is associated with higher emergency department usage; thus, a visit to an ED without having a doctor office visit may indicate potentially avoidable ED visits.[91] Nashville has a high proportion of enrollees visiting an ED compared with many of the peer MSAs. Over 12% of enrollees in Nashville had at least one ED visit, more than the other peer MSAs except Kansas City (15.7%),

90 Our methodology is not restricted to care delivered by a doctor but, instead, relies on place of service to identify office visits. As such, care delivered by a nurse practitioner or a physician's assistant would be included in the Office Visit Count. However, care delivered outside the normal setting such as at a wellness clinic would not be included.

91 See National Priorities Partnership, Compact Action Brief: A Roadmap for Increasing Value in Healthcare, "Reducing Emergency Department Overuse: A $38 Billion Opportunity." Accessed 12/5/2014. See **https://www.qualityforum.org/NPP/docs/Reducing_ED_Overuse_CAB.aspx**.

Memphis (13.4%), and Louisville (13.0%). As high ED use is associated with higher healthcare costs and potentially lower care management, we infer from these findings that there may be opportunities to improve care coordination.

Table 14 Commercially Insured Enrollees with at Least One Emergency Department Visit in Nashville and Peer MSAs in 2012

MSA	At Least One ED Visit	% At Least One ED Visit	Average Number of ED Visits	ED Visit and No Doctor's Office Visit	% ED Visit and No Doctor's Office Visit
National Average*	6,591,581	12.7%	1.5	692,638	1.3%
Atlanta	154,847	11.4%	1.4	15,513	1.1%
Austin	46,247	10.9%	1.5	5,720	1.3%
Charlotte	41,118	11.3%	1.5	3,619	1.0%
Denver	41,047	11.2%	1.4	5,064	1.4%
Indianapolis	70,994	12.3%	1.5	7,932	1.4%
Kansas City	46,666	15.7%	1.6	5,860	2.0%
Louisville	37,887	13.0%	1.5	3,750	1.3%
Nashville	39,187	12.6%	1.6	3,281	1.1%
Memphis	26,328	13.4%	1.6	3,535	1.8%
Raleigh	16,365	9.7%	1.4	1,298	0.8%
Tampa	41,160	12.3%	1.5	4,343	1.3%

*Across all MSAs as proxy for national estimate
Source: Truven Outpatient Services File, 2012

Taken together, these data analyses suggest opportunities to improve care delivery and coordination of care for individuals in the Nashville area. Doing so may prove effective in reducing ED usage, shifting care from the hospital to lower cost locations such as outpatient service locations, and preventing hospitalization through improved disease management and care coordination efforts.

C. Commercially Insured Sample: Cost

The following analysis uses commercial claims data to estimate the distribution of payments paid by insurance companies and patients for care delivered in the inpatient, outpatient, and emergency department settings. Prescription drug payments also are included in the analysis. The 2012 total payment figures can be disaggregated to net payment (actual amount paid by the insurance company) and out-of-pocket payments (payments made by the patient). These out-of-pocket payments are the sum of the coinsurance, copay, and deductible.

Key findings are as follows:

- Nashville has lower outpatient costs compared with its peers; average outpatient costs are lower in only two of the peer MSAs.
- Nashville has the lowest average deductible cost at $126 per outpatient visit.
- Nashville has below average emergency department visit costs compared with its peers.
- Nashville has a higher than average cost for office visits, but the range of costs between the sampled MSAs is narrow.

Table 15 demonstrates the average patient cost (pay) for the MSAs in our analysis for ED visits (both for all visits and then separately for those patients visiting an ED who did not have a primary care visit in the same year), for primary care visits[92], specialty visits, and inpatient hospitalizations. The ranking in average patient costs (payments) by setting from most to least expensive is as follows: inpatient, ED without a primary care visit, ED visit, outpatient visit (excluding a doctor office visit), specialty doctor office visit, and primary care doctor office visit.

Nashville tends to have lower outpatient costs ($342), and lower emergency room costs ($1,642) compared with its peers. Nashville's primary care office visit ($165), specialty office visit ($177) and inpatient visit ($18,420) costs are close to the median for the MSA group, while ED without a primary care visit ($1,343) costs tend to be higher compared with its peers.

Table 15 Commercially Insured Average Cost per Patient by Visit Type

MSA	Outpatient Visit	Emergency Visit	ED Without Primary Care Visit	Primary Care Visit	Specialty Visit	Inpatient Visit
National Average*	$363	$1,310	$1,647	$147	$322	$18,312
Atlanta	$379	$1,545	$1,230	$177	$189	$19,116
Austin	$328	$1,918	$1,673	$164	$180	$20,485
Charlotte	$393	$1,795	$1,312	$190	$199	$18,172
Denver	$375	$2,209	$2,006	$168	$181	$20,548
Indianapolis	$437	$1,666	$1,319	$137	$143	$21,212
Kansas City	$377	$1,387	$958	$136	$144	$16,012
Louisville	$309	$1,302	$1,029	$117	$118	$14,560
Memphis	$368	$1,586	$1,258	$174	$189	$17,430
Nashville	$342	$1,642	$1,343	$165	$177	$18,420
Raleigh	$354	$1,976	$1,608	$169	$181	$16,399
Tampa	$347	$1,951	$1,609	$159	$171	$19,511

*Across all MSAs as proxy for national average
Source: Authors' calculations using Truven Commercial Claims Inpatient and Outpatient Services Files, 2012

Table 16 shows Nashville's ranking by cost based on commercial claims data for the six place-of-service categories. Blue cells indicate Nashville's costs are lower, and red cells indicate Nashville's costs are higher relative to the peer MSAs. The table shows how Nashville compares with its peers regarding average costs (pay) by setting: Nashville has lower outpatient and ED visit costs; inpatient, primary care office, and specialty office visit costs are closer to the median; and ED without a primary care visit costs appear to be somewhat higher than the average across all peer MSAs.

92 A primary care visit is defined as a visit to a doctor's office where the practitioner is identified as a primary care provider in the claims data.

Table 16 Nashville's Average Commercially Insured Payment by Office Type Rankings

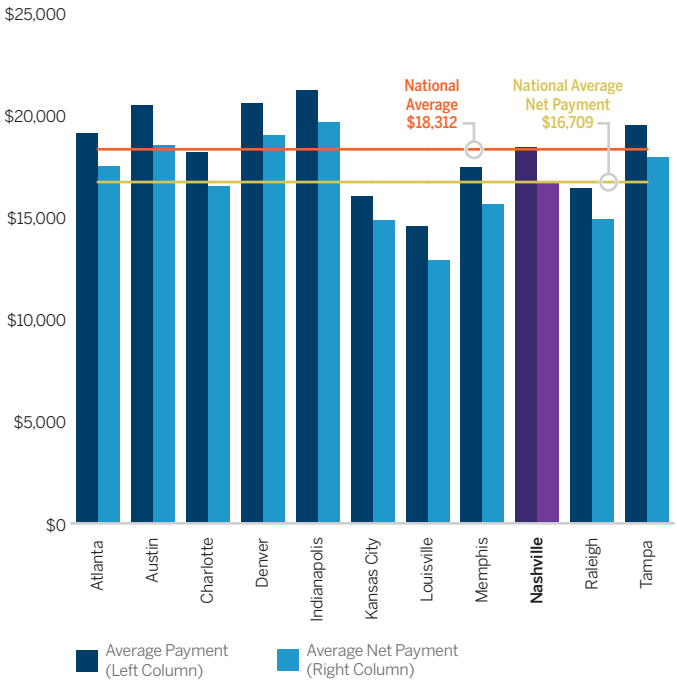
Variable	Outpatient Visit	Emergency Visit	ED Without Primary Care Visit	Primary Care Visit	Specialty Visit	Inpatient Visit
Average Payment	3	5	7	6	5	6
Average Net Payment	3	6	7	6	6	6
Average Coinsurance	3	2	3	6	6	4
Average Copay	7	1	1	9	9	4
Average Deductible	1	1	2	1	1	2

Source: Authors' calculations using Truven Commercial Claims Inpatient and Outpatient Services Files, 2012

1. 2012 Inpatient Payments

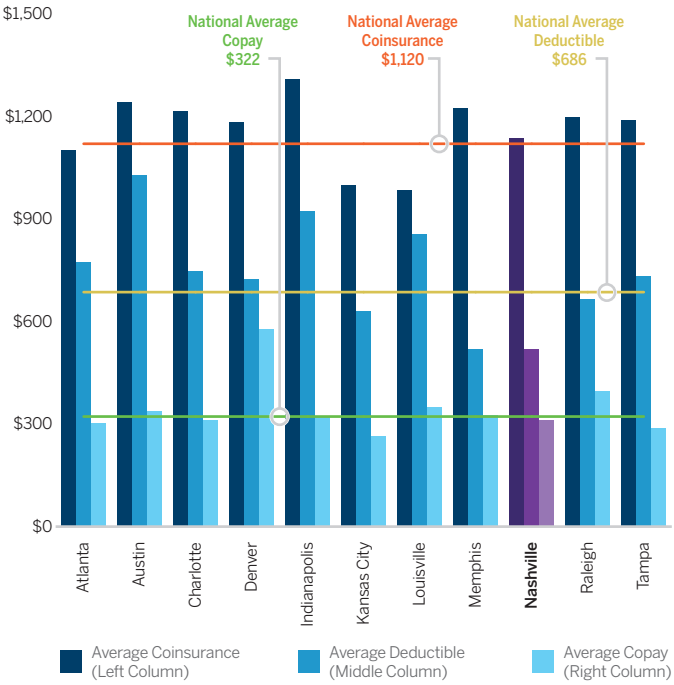
Figure 16 and **Figure 17** present average patient payments for visits where the patient had an inpatient stay at a hospital.[93] In 2012, Nashville had an average cost of $18,420 per inpatient stay. Among its peers, the range of average cost for an inpatient stay is highest in the Indianapolis MSA ($21,212) and lowest in the Louisville MSA ($14,560). Patients paid, on average, $520 through their deductible, $313 on copay, and $1,137 through their coinsurance where they had a payment through their deductible, copay, or coinsurance, respectively.

Figure 16 Commercially Insured Inpatient Average and Net Payments per Stay



Note: Purple color highlights the Nashville MSA's average payment (dark purple) and net payment (light purple). Net payment is the amount paid by the insurance company.
Source: Authors' calculations using Truven Commercial Claim Inpatient Services Files, 2012

Figure 17 Commercially Insured Inpatient Average Copay, Deductible, and Coinsurance



Note: Purple color highlights the Nashville MSA's average coinsurance (dark), deductible (lighter) and copay (lightest)
Source: Authors' calculations using Truven Commercial Claims Inpatient Services Files, 2012

2. 2012 Outpatient Payments

We conducted a similar analysis assessing costs related to commercially insured outpatient service utilization (presented in **Appendix Figure 19**). This includes outpatient procedures, including hospital visits that did not require an overnight stay,[94] outpatient surgery, emergency department visits, and standard doctor office visits. In 2012, outpatient visits in the Nashville MSA had an average cost of $342 per visit. Average cost for an outpatient visit is highest in the Indianapolis MSA at $437 and lowest in the Louisville MSA at $309. Insurance companies, on average, paid $275 per outpatient visit where the average ranges from $234 to $349 in peer MSAs. Average patients' deductible was $126, the lowest in the peer MSAs range of $126-$189. Average copay was $34; the peer MSA range was $29-$37. Average coinsurance was $72; the peer MSA range was $68-$96.[95] In terms of average pay, average net pay, average co-benefits, and average coinsurance, Nashville ranks ninth among its peers. It ranks fifth in terms of average copay. Nashville has the lowest average deductible for outpatient visits.

3. 2012 ED Payments

Similar to our inpatient cost analysis, we assessed the distribution of average payments within each MSA for emergency department visits (presented in **Appendix Figure 20**). In 2012, the average cost in the Nashville MSA per emergency room visit

93 We use average payment (cost) in this analysis so that our cost measure is consistent for all sections of the report that rely on commercial claims cost data (e.g., the outpatient and chronic condition analysis). Although we do not adjust inpatient cost to reflect the intensity of treatment in this current report, future work may incorporate these adjusted cost measures.

94 Overnight stays are identified as claims that have a room and board charge.

95 Averages are computed for claims that were subject to deductible, copay, or coinsurance. If a claim did not have any portion of the payment due from the patient, it was excluded from the average calculation.

was $1,642; among the full sample of peer MSAs, it ranged from $1,302 (Louisville) to $2,209 (Denver). Insurance companies, on average, paid $1,302 per emergency room visit in Nashville compared with a range of $955-$1,781 in peer MSAs. On average, patients with an emergency room visit in Nashville paid $406 for their deductible (the lowest of the peer group range of $406-$644), $108 for the copay (the lowest in the peer MSA range of $108-$142), and $189 for their coinsurance (the overall range was $170-$275).

4. Average Pharmaceutical Drug Payments

Table 17 presents per patient pharmaceutical cost information. Although the average pharmaceutical drug payment per patient in Nashville, $1,243, is greater than that in many of the other MSAs included in this analysis, the total range among MSAs is narrow: $1,008-$1,306. Nashville's $1,243 is the third highest in all 11 MSAs in 2012.

Table 17 Average Drug Payments per Patient for Nashville and Peer MSAs, 2010-2012

MSA	2010	2011	2012
Atlanta	$1,108	$1,143	$1,144
Austin	$937	$974	$1,008
Charlotte	$1,087	$1,116	$1,100
Denver	$1,017	$1,051	$1,108
Indianapolis	$1,171	$1,266	$1,187
Kansas City	$1,107	$1,136	$1,122
Louisville	$1,226	$1,341	$1,267
Nashville	$1,203	$1,195	$1,243
Memphis	$1,137	$1,180	$1,230
Raleigh	$1,283	$1,302	$1,194
Tampa	$1,220	$1,241	$1,306

Source: Authors' calculations using Truven Outpatient Pharmaceutical Files — 2010, 2011, 2012

VIII. Healthcare Utilization and Cost: Medicare

We developed data and information for several measures of cost and utilization for Medicare beneficiaries in the Nashville MSA and its peer group. These are reported in the table below and include several measures of inpatient and outpatient utilization and cost. The sample of Medicare beneficiaries used is based on the fee-for-service population, and includes only those Medicare beneficiaries who were covered through both parts A and B and were not enrolled in an HMO at any point during the year. Cost represents the amount Medicare pays for services and is exclusive of any beneficiary cost sharing. In exploring differences between the Nashville and peer MSAs, we focus on cost metrics (total costs per beneficiary, inpatient total costs per beneficiary, outpatient total costs per beneficiary) and specific utilization metrics (inpatient stays per 1,000 beneficiaries, outpatient stays per beneficiary, percent of beneficiaries with an inpatient visit, outpatient visits per 1,000 beneficiaries, readmissions, and emergency department visits per 1,000 beneficiaries).[96] Some key findings of our analysis include:

- For 2012, Nashville has an above average level of inpatient stay volume (third in inpatient stays per 1,000 beneficiaries across the peer group) but has a lower inpatient cost ranking (fifth in inpatient cost per beneficiary across the peer group). This implies that although inpatient stays are more frequent, they are for lower acuity care (a higher cost rank would suggest more intensive treatment).
- While Nashville's inpatient utilization is high, it has declined over time. Across the 10 peer group MSAs, Nashville has decreased its ranking of the percent of beneficiaries who use inpatient services from third in 2008 (21.5%) to fourth in 2012 (18.9%).
- Among the 10 peer group MSAs, Nashville has the highest number of readmissions per inpatient stay. Over the period 2008 through 2012 Nashville consistently ranked in the top three, with approximately 19% of total inpatient stays classified as readmissions.
- Cost per beneficiary has decreased over time. Across the 10 peer group MSAs, Nashville has dropped from third in 2008 ($8,792) to sixth in 2012 ($9,189).
- Emergency department utilization has declined. Across the 10 peer group MSAs, Nashville has dropped from third in ED visits per 1,000 beneficiaries in 2008 (671 visits) to sixth in 2012 (664 visits).

96 The CMS Geographic Variation and Public Use File was used to analyze the distribution of Medicare beneficiaries, costs, and utilization for counties in the United States. The Geographic Variation and Public Use File can be found at: **http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html**.

Table 18 presents Nashville's statistics for these specific cost and utilization measures for the years 2008 to 2012. Cells are shaded in gray if Nashville was above the national rate for that metric in that particular year. Nashville had the highest readmission rate among its peer group in 2012 and has been consistently higher than the national rate from 2008 to 2012.[97] Nashville also had an above average utilization rate of inpatient services for Medicare. It has had an above national rate of inpatient stays per beneficiary and a higher amount of Medicare beneficiaries utilizing inpatient services than the national rate.

Table 18 Nashville Medicare Statistics, 2008-2012

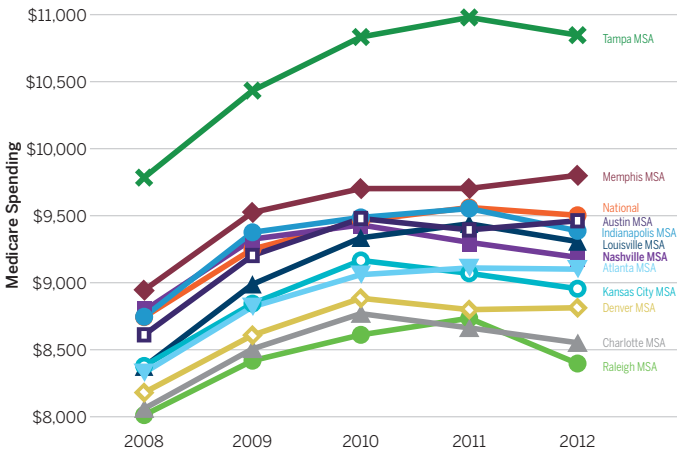
Metric	2008	2009	2010	2011	2012
Total Costs per Beneficiary	$8,792	$9,325	$9,431	$9,301	$9,189
Inpatient Cost per Beneficiary	$3,176	$3,289	$3,194	$2,958	$2,936
Outpatient Cost per Beneficiary	$726	$816	$866	$909	$930
Inpatient Stays per 1,000 Beneficiaries	368	359	344	326	318
Outpatient Stays per Beneficiary	3.4	3.4	3.4	3.4	3.4
Beneficiaries with an Inpatient Visit (%)	21%	21%	20%	19%	19%
Beneficiaries with an Outpatient Visit (%)	65%	64%	64%	64%	63%
Percent of Inpatient Stays That Are Readmissions	19%	19%	19%	18%	19%
Emergency Department Visits per 1,000 Beneficiaries	671	672	667	659	664

Note: Blue highlighting indicates years when Nashville was above the national rate.
Source: Authors' calculations using the CMS Geographic Variation Public Use File, 2012

A. Medicare Cost

Figure 18 shows that from 2008 to 2012 Nashville's Medicare cost per beneficiary aligns with the median across the peer group. Tampa has consistently had the highest Medicare cost per beneficiary, while Raleigh and Charlotte consistently have had the lowest Medicare cost per beneficiary. In 2012, Nashville ranked sixth (average) in total Medicare Cost per beneficiary across the 10 peer group MSAs, with $9,189 spent per beneficiary. In 2008, Nashville had higher spending than the national average of $8,743 (Nashville had a cost of $8,792 per beneficiary in 2008), but spending declined and was lower than the national average ($9,502) in 2012.[98]

Figure 18 Total Medicare Cost per Beneficiary in Peer Group MSAs and Nationally, 2008-2012

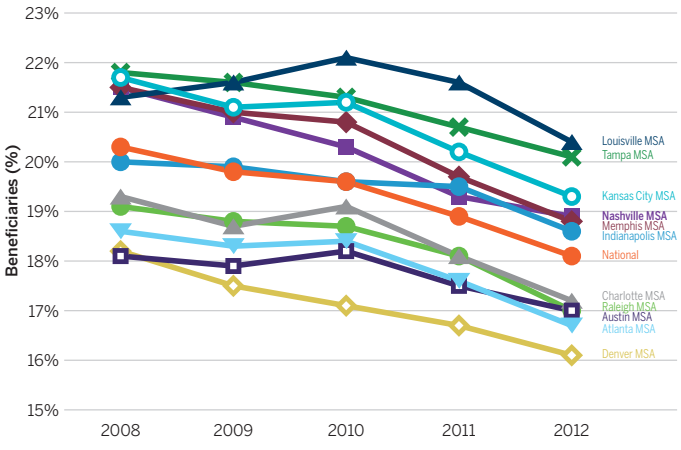


Source: Authors' calculations using the CMS Geographic Variation Public Use File, 2008-2012

B. Medicare Inpatient Utilization

Figure 19 shows that along with the peer group, Nashville has had a substantial decline in the number of beneficiaries who use inpatient services. In 2012, Nashville ranked fourth in inpatient utilization across the peer group, with 18.9% of beneficiaries using inpatient services. In 2008, Nashville had a higher percentage of beneficiaries with an inpatient visit compared with the national average of 20.3% (Nashville had 21.5% of its beneficiaries with an inpatient visit in 2008), and it was higher than the national average (18.1%) in 2012.

Figure 19 Inpatient Users – Percentage of Beneficiaries with an Inpatient Stay in Peer Group MSAs and Nationally, 2008-2012



Source: Authors' calculations using the CMS Geographic Variation Public Use File, 2008-2012

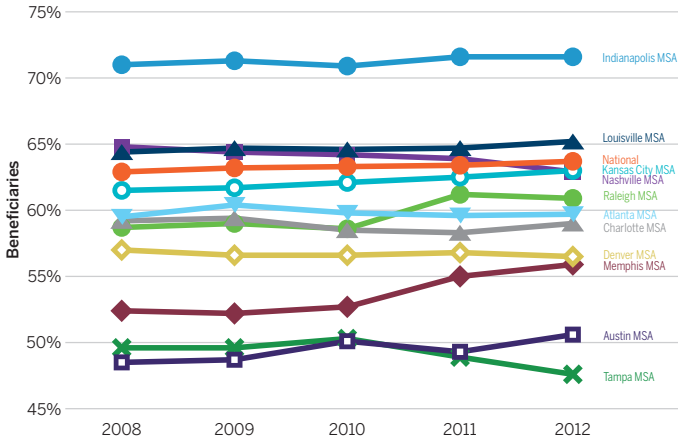
97 The Geographic Variation and Public Use File defines its readmission measure as "admissions that occur within 30 days of the initial discharge and the readmission rates presented are not risk adjusted."

98 We use actual cost in our analysis so that our cost measure is consistent across both the commercial and Medicare samples. However, future work may incorporate an additional Medicare cost analysis using adjusted cost measures.

C. Medicare Outpatient Utilization

Figure 20 shows that Nashville has ranked in the top half for Medicare beneficiaries who use outpatient services. Indianapolis consistently has ranked the highest and Tampa and Austin have ranked the lowest. In 2012, Nashville ranked fourth in the percentage of beneficiaries with an outpatient visit across the 10 peer group MSAs, with 62.9% of beneficiaries using outpatient services. In 2008, Nashville had a higher percentage of beneficiaries with an outpatient visit compared with the national average of 62.9% (Nashville had 64.8% of its beneficiaries with an inpatient visit in 2008), and was lower than the national average (63.7%) in 2012.

Figure 20 Outpatient Users – Percentage of Beneficiaries with an Outpatient Visit in Peer Group MSAs and Nationally, 2008-2012



Source: Authors' calculations using the CMS Geographic Variation Public Use File, 2008-2012

IX. Quality of Care

High-quality healthcare is a key component in supporting a healthy community. Quality healthcare means that patients receive appropriate care that meets their needs and that leads to a high level of patient satisfaction.[99] More broadly, quality of care implies that care is coordinated so that patients have appropriate discharge instructions and a plan of care that reduces the likelihood of a readmission. To assess hospital quality in the Nashville and the peer MSA group, readmissions and CMS hospital quality measures are helpful.

A. Readmission Analysis

Hospital readmission – and more specifically, avoidable readmission – is an important and long-standing topic in the debate over healthcare quality and cost. Readmission statistics often are used to measure the quality of care in a given geographic area and have a direct correlation with high costs of care. A seminal 1984 study found that 22% of Medicare hospitalizations from 1974-1977 were followed by a readmission within 60 days of discharge.[100] According to the Institute for Healthcare Improvement, hospitalizations account for almost "one-third of the $2 trillion spend on healthcare in the United States."[101] For Medicare alone, the Robert Wood Johnson Foundation estimates that preventable readmissions cost Medicare about $12 billion a year.[102]

Preventable readmissions are based on the application of specific criteria. Most methodologies identify readmissions that occurred within a specific time frame (e.g., 30, 60, or 90 days after the initial admission) and for specific reasons, usually related to the original admission. Most compare those rates to an expected rate of readmission. For example, data are provided on the New York State Department of Health website on potentially preventable readmissions (PPR) and are calculated using a specific methodology, the Potentially Preventable Readmission software created by 3M Health Information Systems. Other approaches for estimating similar measures of readmissions using data such as those provided in the CMS Hospital Compare are based on studies performed by researchers at the Yale New Haven Health Services Corporation Center for Outcomes Research.[103] A recent (2014) publication authored by the latter researchers from the Yale-New Haven Health Services Corporation Center for Outcomes Research and Evaluation, entitled the *Medicare Hospital Quality Chartbook*, makes use of several measures related to readmissions including condition-specific (acute myocardial infarction (AMI) heart failure, pneumonia, chronic COPD, and ischemic stroke), procedure-specific measures (primary elective total hip and/or knee arthroplasty and isolated CABG surgery) as well as hospital-wide readmission measures.[104]

Estimating comparable statistics for Nashville hospitals and for the peer group MSA hospitals is a complex undertaking beyond the scope of this initial report. In particular, the most recent release of the Hospital Compare data from CMS does not appear to have sufficient representation among all Nashville or other area hospitals to be able to have a complete sample from which to conduct the assessment. Applying and testing the Yale methodology on the Truven data, moreover, are extensive tasks.

99 Our analysis of quality is restricted to the hospital setting. Data that would allow us to perform a meaningful analysis of quality of care in all other healthcare settings are not available.

100 See **http://www.nejm.org/doi/full/10.1056/NEJM198411223112105**.

101 See **http://www.ihi.org/topics/readmissions/Pages/default.aspx**.

102 Ibid.

103 The Potentially Preventable Readmission software created by 3M Health Information Systems identifies hospital admissions clinically related to an initial admission within a specified time period. For this dataset, readmissions were evaluated within a 30-day time period from the discharge date of the initial hospital admission. A PPR may have resulted from a deficiency in the process of care and treatment at the initial hospitalization or lack of post-discharge follow-up. PPRs are not defined by unrelated events that occur post-discharge such as admissions for trauma. See also Schwartz J. et al., Medicare Hospital Quality Chartbook 2014: Performance Report on Outcome Measures. Prepared by Yale-New Haven Health Services Corporation Center for Outcomes Research and Evaluation; Evaluation for the Centers for Medicare & Medicaid Services, September 2014: **http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Downloads/Medicare-Hospital-Quality-Chartbook-2014.pdf**.

104 For more detail on the data and methodology, see Schwartz J. et al., *Medicare Hospital Quality Chartbook 2014: Performance Report on Outcome Measures Measures*. Prepared by Yale-New Haven Health Services Corporation Center for Outcomes Research and Evaluation; Evaluation for the Centers for Medicare & Medicaid Services, September 2014.

We do note, however, that review of the most recent reports suggests that risk-standardized readmission measures for the condition-specific categories mentioned above, as well as hospital-wide readmissions for the broader Nashville area, indicate that the area has somewhat poorer performance than the national average. We are hesitant to draw stronger inferences from these statistics for a number of reasons, other than they support the need for further research and investigation into sound metrics on preventable readmissions and a determination of whether such indicators support the need for additional interventions.[105]

B. Hospital Performance

Hospital quality measures can be used to estimate how well hospitals provide recommended care to their patients. Accordingly, these data provide feedback to healthcare providers that they can use to address shortcomings and improve the quality of care over time. This section assesses how the quality of healthcare in the Nashville MSA compares with the national average, as well as its peer MSAs. Hospital Compare[106] data and the measures constructed by CMS were used to assess quality of care at the hospital level.[107] Our analysis produced several findings:

- Nashville ranked third among the peer group, with 81% beds above the national average (51.8) for the timely and effective care domain.
- Nashville and Austin tied in second place, with 81% beds above the national average (32.6) in the patient experience domain.
- Just over 30% of beds in Nashville were above average (31.3) in the outcome domain.

The CMS Hospital Compare database reports Hospital Value-Based Purchasing (HVBP) data.[108] The HVBP program initiative rewards hospitals based on the quality of care they provide to Medicare patients. Hospitals are evaluated on performance scores calculated by CMS in three domains.[109] Each hospital's performance score is assessed by comparing its achievement and improvement scores for each applicable measure within the domain. Hospitals are evaluated based on the following categories:

- **Timely and Effective Care** measures evaluate how often, quickly and efficiently hospitals provide recommended treatments for heart, pneumonia and surgical patients.
- **Patients' Experience** measures report recently discharged patients' perceptions of their hospital experience.
- **Outcome** measures are captured by mortality rates, which are expressed as survival rates for certain health conditions.

Our analysis uses these three aggregate measures (Timely and Effective Care, Patients' Experience, and Outcome) to assess quality of care. MSA-level performance is assessed using each category independently where the score is in reference to the national average. For each MSA (Nashville and the 10 MSA peer group), we report the percentage of beds in the MSA above and below the national average.[110]

The three composite measures we use to assess quality – Timely and Effective Care, Patients' Experience, and Outcome – are based on a specific set of individual measures. Timely and Effective Care[111] measures assess how carefully hospitals follow best clinical practices and consist of these 13 individual measures:

- AMI-7a: Fibrinolytic therapy received within 30 minutes of hospital arrival
- AMI-8a: Primary percutaneous coronary intervention received within 90 minutes of hospital arrival
- HF-1: Discharge instructions
- PN-3b: Blood cultures performed in emergency department prior to initial antibiotic received in hospital
- PN-6: Appropriate initial antibiotics
- SCIP-Inf-1: Antibiotics within one hour before surgery
- SCIP-Inf-2: Appropriate antibiotics
- SCIP-Inf-3: Discontinuance of antibiotics within 24 hours
- SCIP-Inf-4: Cardiac surgery patients with controlled 6 a.m. postoperative serum glucose
- SCIP-Inf-9: Urinary catheter removal on postoperative day 1 or postoperative day 2
- SCIP-Card-2: Patients who received beta-blockers preoperatively
- SCIP-VTE-1: Blood clots treatment ordered by doctor
- SCIP-VTE-2: Blood clot treatment within 24 hours after surgery

Survey of Patients' Experience[112] evaluates how well hospitals provide care that improves their patients' experience during

105 For example, the reported data are estimated at the Hospital Referral Region (HRR) level, which tend to be far broader than MSAs. It is unclear from the report as to the set of hospitals included in the data.

106 Hospital Compare was created by Medicare and Hospital Quality Alliance (HQA) to help consumers make informed decisions about healthcare.

107 Other reports that use Hospital Compare measures to assess quality of care include The Joint Commission (**http://www.jointcommission.org/assets/1/6/TJC_Annual_Report_2013.pdf**) and The Leapfrog Group (**http://www.hospitalsafetyscore.org/media/file/HospitalSafetyScore_ScoringMethodology_Fall2013_Updated.pdf**).

108 The publicly reported HVBP scores can be found at: **http://www.medicare.gov/hospitalcompare/data/total-performance-scores.html**. Our analysis uses scores as of 12/17/2014.

109 Fiscal Year 2014 Scoring Methodology is detailed in the Federal Register Final Rule document. See **http://www.gpo.gov/fdsys/pkg/FR-2011-11-30/pdf/2011-28612.pdf**.

110 We use a weighted average where each hospital's score is weighted by bed size.

111 Baseline period: April 1, 2010-December 31, 2010; Performance period: April 1, 2012-December 31, 2012.

112 Baseline period: April 1, 2010-December 31, 2010; Performance period: April 1, 2012-December 31, 2012.

hospital stays. This domain comprises the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The eight dimensions within this measure include:

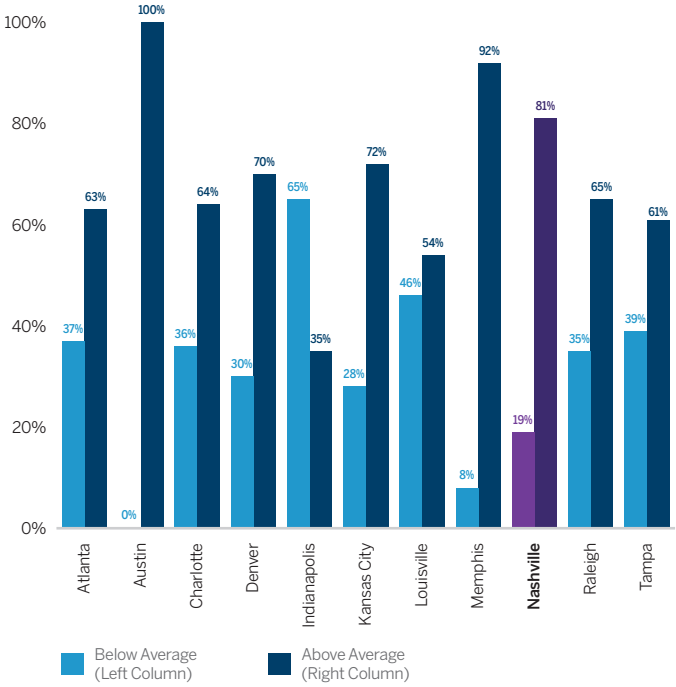
- Nurse communication
- Doctor communication
- Responsiveness of hospital staff
- Communication about medicine
- Pain management
- Discharge information
- Cleanliness and quietness of hospital environment
- Overall rating of hospital

Outcome measures[113] are mortality rates (expressed as survival rates) for certain health conditions. Patients with access to high-quality care during hospitalizations likely will have better outcomes such as survival and quality of life. The three measures within this category are:

- MORT-30-AMI: Acute myocardial infarction 30-day mortality rate
- MORT-30-HF: Heart failure 30-day mortality rate
- MORT-30-PN: Pneumonia 30-day mortality rate

As evidenced in **Figure 21**, Nashville area hospitals show high adherence to the best clinical processes, with 81% of beds above the national average for the Timely and Effective Care measure.

Figure 21 Percent of Beds Above or Below National Average for Timely and Effective Care in Nashville and Peer MSAs

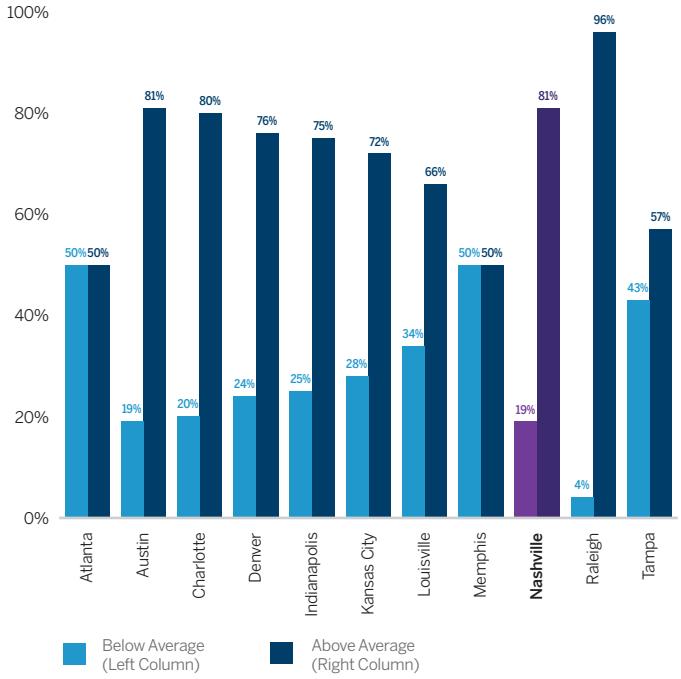


Note: Light purple indicates below average and dark purple indicates above average for the Nashville MSA
Source: Authors' calculations using the Centers for Medicare & Medicaid Services Hospital Compare Hospital Value-Based Purchasing Scores as of 12/17/2014 and the American Hospital Association's 2012 Survey Database

Figure 22 shows that patients in Nashville are satisfied with the care they receive. Nashville and Austin tied in second place, with 81% beds above the national average (32.6) in the Patient Experience domain. Only Raleigh had a higher satisfaction rate, with 96% beds above the national average. Memphis and Atlanta ranked the lowest, with 50% of beds above the national benchmark.

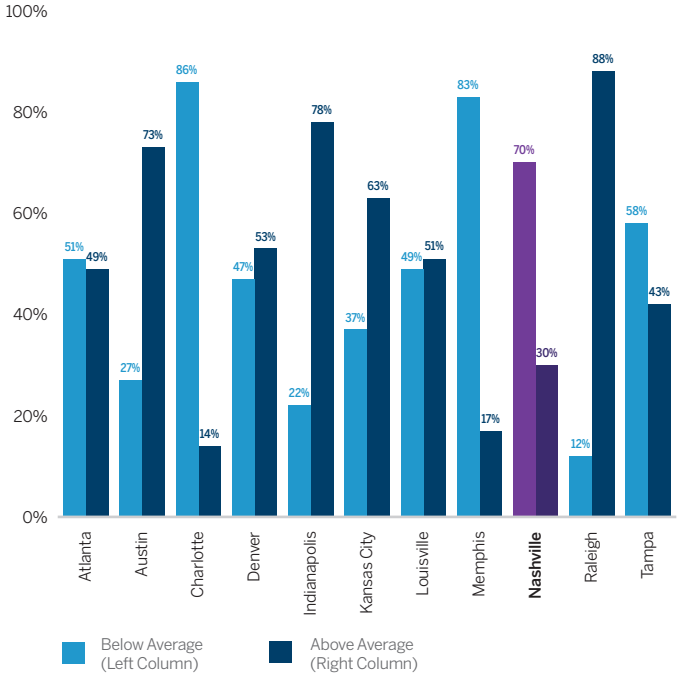
113 Baseline period: July 1, 2009-June 30, 2010; Performance period: July 1, 2011-June 30, 2012.

Figure 22 Percent of Beds Above or Below National Average for Patient Experience in Nashville and Peer MSAs



Note: Light purple indicates below average and dark purple indicates above average for Nashville MSA
Source: Authors' calculations using the Centers for Medicare & Medicaid Services Hospital Compare Hospital Value-Based Purchasing Scores as of 12/17/2014 and the American Hospital Association's 2012 Survey Database

Figure 23 Percent of Beds Above or Below National Average for Survival Rates in Nashville and Peer MSAs



Note: Light purple indicates below average and dark purple indicates above average for the Nashville MSA
Source: Authors' calculations using the Centers for Medicare & Medicaid Services Hospital Compare Hospital Value-Based Purchasing Scores as of 12/17/2014 and the American Hospital Association's 2012 Survey Database

The Outcome measure captures the 30-day survival rate for patients treated for AMI, heart failure, and pneumonia. In Nashville, 30% of beds fall above the national average (31.3) in the Outcome measure as shown in **Figure 23.** This means that about 30 out of every 100 beds in Nashville are located at hospitals that have above average 30-day survival rates for AMI, heart failure, and pneumonia patients. It should be noted that the Outcome score may be influenced by patient mix. Academic teaching hospitals and other hospitals that have a reputation for providing high quality of care may attract a disproportionate share of the critically ill and, as a result, may have higher mortality rates. This, in turn, would result in a lower Outcome score.

X. Conclusion

In this report, we present an in-depth analysis of health and of certain components of the healthcare delivery system in the Nashville region. Our key areas of focus can be broadly grouped into five categories: population level health and chronic conditions; access; utilization; costs; and hospital quality. These key areas provide insight into the health needs and health system performance in a given community. This analysis was conducted to provide an assessment of the current status of health and healthcare in the Nashville region so that policymakers and stakeholders have a more accurate, reliable, and locally robust set of information and comparators that can be used to guide policy decisions and the development of initiatives for their specific region.

Based on our analysis, the Nashville region performs well in many respects, outpacing its peer group in several categories. Nashville has a strong physician supply and, relative to the peer MSA group, is well-placed to meet the healthcare needs of the community. Costs as measured by average payments are relatively low, indicating that healthcare is comparatively more affordable and potentially presents less financial strain to Nashville residents than in the peer MSAs. Utilization is somewhat higher than average, and, although this may mean that individuals are proactive in managing their health and are seeking appropriate care, it also may indicate that opportunities for better coordinated care exist generally and for the specific diseases studied. The quality of care delivered in the hospital setting meets with high patient satisfaction, but Outcome measures are below average. In assessing several important population health measures across the Nashville region – leading indicators – in the Nashville region and in its peer MSAs, we find that smoking, cardiac health, mental health, and physical activity particularly warrant attention. These areas represent health factors for which Nashville either underperforms or it is at its midpoint compared with its peers, even after controlling for differences in population diversity. The detailed data and analyses across the four chronic conditions, including asthma, diabetes, COPD, and depression, as well as health behaviors, provide a sound basis to inform next steps for stakeholders.

Identifying and understanding areas of need are the first critical steps in developing interventions and promoting health improvement on a coordinated basis. These findings form the starting point for the next phase of this project, which will be centered on developing interventions to improve population and workforce health. Translating these findings into action requires a multipart process among stakeholders. For example, based on the findings of the report, reducing the high smoking rate in Nashville emerges as an important public health objective. The next phase of this project would entail additional information gathering regarding current policies and initiatives in Nashville for this and other areas. We also will review successful programs and interventions implemented in other regions in order to develop a list of possible strategies that could be used to drive change. The possible initiatives will be reviewed for fit and potential success in Nashville given the healthcare infrastructure currently in place, as well as other factors that can facilitate improvement or that may need to be addressed to enhance the likelihood of success (e.g., transportation). Programs will be evaluated to determine not only efficacy but the financial and workforce productivity impact as well (both cost to develop and deploy the program and the expected cost savings from changing behavior). Part of the process for this and other health issues or conditions can include developing locally relevant targets or goals for programs and initiatives – national or regional benchmarks, or ones tailored to aspirational targets relative to peer groups or other metrics. Once this information is in hand, we will work with major stakeholders to select, assess, and implement the best solutions.

Knowing where one stands and making the decision to commit resources toward improvement sends the message that the community is committed to improvement and to providing a high quality of life to all of its residents. Addressing areas of need represents a critical investment in the health, wellbeing, and productivity of those in the Nashville region. Healthier residents are better able to participate in and contribute to the economic prosperity of the region. Individuals or employers contemplating relocation can be assured that Nashville is well-positioned to meet the healthcare needs of its residents and to respond to both current and future healthcare challenges.

Appendix

Center for Healthcare Economics and Policy

Nashville Area Chamber of Commerce
THE RESEARCH CENTER

Table of Contents

I. Appendix

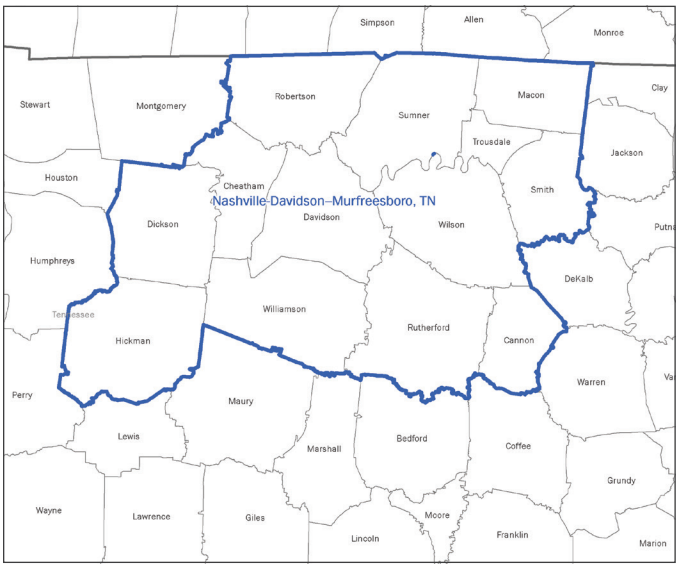
A. Geographic Area Overview – Nashville and Peer MSAs

These sections contain an overview of each region, including a map of each Metropolitan Statistical Area (MSA), a list of the counties included, and select summary statistics.[114] Population, income, education, and gender were compiled using 2012 U.S. Census Bureau data.[115] Hospital capacity and bed statistics were compiled using 2012 American Hospital Association (AHA) data.[116] Also included in this section are tables that provide information on each MSA's healthcare provider market.[117] The tables contain information on the various health systems located in each of the sampled MSAs, along with a description of the hospitals owned by each health system.

1. Nashville

The Nashville MSA has a population of 1,644,700 as of 2012, of which an estimated 51.1% are female. It has a median income of $51,500. Regarding education, 31.1% of the age 25 and over population have a bachelor's degree or above. There are 24 hospitals with a total bed capacity of three beds per 1,000 people. There are 13 counties in the Nashville MSA, all of which are located in Tennessee. These counties are Cannon, Cheatham, Davidson, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson, and Wilson and are outlined in **Appendix Figure 1** to the right.[118] Hospital capacity and bed statistics are presented in **Appendix Table 1** on the next page.

Appendix Figure 1 The Nashville Metropolitan Statistical Area



114 The analysis relies on 2009 MSA delineations. As such, Maury County is not included in the Nashville MSA.

115 U.S. Census Bureau, "Population Estimates Database." For more information on the dataset, see **http://www.census.gov/topics/population/data.html**.

116 American Hospital Association, "2013 AHA Annual Survey Database." For more information on the dataset, see **http://www.ahadataviewer.com/book-cd-products/AHA-Survey/**.

117 These data come from the American Hospital Association's Annual Hospital Survey of 2013. For more information on the dataset, see: **http://www.ahadataviewer.com/book-cd-products/AHA-Survey/**. Where population figures are presented, the U.S. Census Bureau's Population Data were used. For more information on the dataset, see **http://www.census.gov/topics/population/data.html**.

118 The analysis relies on 2009 MSA delineations. As such, Maury County is not included in the Nashville MSA.

Appendix Table 1 The Nashville MSA Hospital Capacity and Bed Statistics

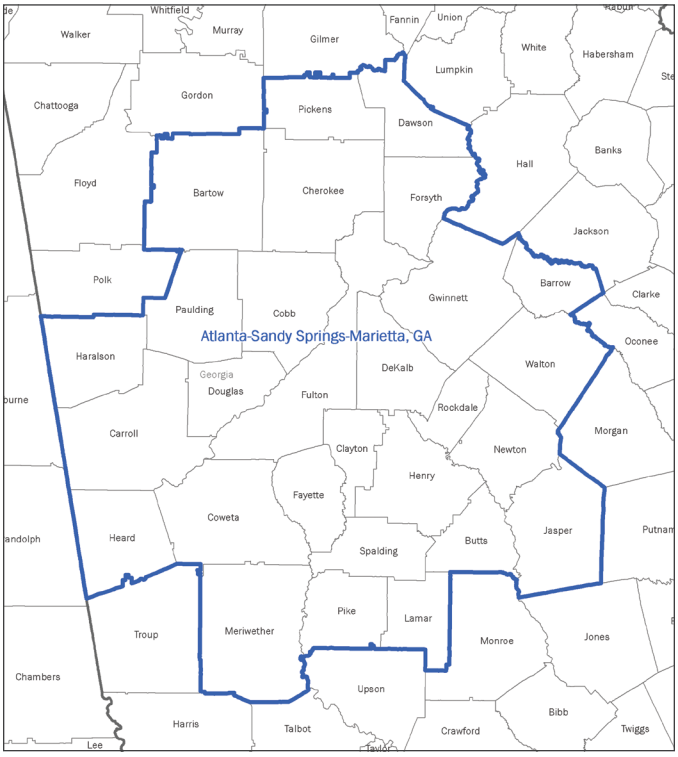
Population Estimate, 2012	1,644,700		**Independent Competitors**		10
Medicare Total Costs, 2012	$1,242,793,472		**Beds/1,000 People**		3.00
Healthcare System	**Total Hospitals**	**Hospital Name**	**Hospital City**	**Total Beds**	**Teaching Status**
Total	**24**			**4,938**	
HCA	**9**			**1,833**	
		Tristar Centennial M.C.	Nashville	641	Non-teaching
		TriStar Skyline M.C.	Nashville	295	Minor teaching
		TriStar Skyline Madison Campus	Madison	284	Minor teaching
		TriStar Summit M.C.	Hermitage	188	Non-teaching
		TriStar Horizon M.C.	Dickson	130	Minor teaching
		TriStar Southern Hills M.C.	Nashville	101	Minor teaching
		TriStar StoneCrest M.C.	Smyrna	101	Minor teaching
		TriStar Hendersonville M.C.	Hendersonville	81	Minor teaching
		Tristar Ashland City	Ashland City	12	Non-teaching
Ascension Health	**5**			**1,194**	
		Saint Thomas Midtown Hosp.	Nashville	425	Minor teaching
		Saint Thomas West Hosp.	Nashville	395	Minor teaching
		Saint Thomas Rutherford Hosp.	Murfreesboro	286	Minor teaching
		Saint Thomas Hickman Hosp.	Centerville	65	Non-teaching
		Saint Thomas Hosp. for Spinal Surgery	Nashville	23	Non-teaching
Vanderbilt Health	**1**			**966**	
		Vanderbilt Hosp. and Clinics	Nashville	966	Major teaching
Health Management Associates	**1**			**245**	
		University M.C.	Lebanon	245	Minor teaching
LifePoint Hosps., Inc.	**3**			**233**	
		Sumner Regional M.C.	Gallatin	145	Minor teaching
		Riverview Regional M.C.	Carthage	63	Non-teaching
		Trousdale M.C.	Hartsville	25	Non-teaching
Williamson M.C.	**1**			**185**	
		Williamson M.C.	Franklin	185	Non-teaching
Nashville General Hosp.	**1**			**116**	
		Nashville General Hosp.	Nashville	116	Minor teaching
Northcrest M.C.	**1**			**81**	
		Northcrest M.C.	Springfield	81	Minor teaching
Capella Healthcare	**1**			**60**	
		Stones River Hosp.	Woodbury	60	Non-teaching
QHR	**1**			**25**	
		Macon County General Hosp.	Lafayette	25	Non-teaching

HCC = Healthcare Corporation; M.C. = Medical Center

2. Atlanta

The Atlanta MSA has a population of 5,436,602 as of 2012, of which an estimated 51.3% are female. It has a median income of $54,628. Regarding education, 34.9% of the age 25 and over population have a bachelor's degree or above. There are 38 hospitals, which are divided among 17 healthcare networks or systems. There are 28 counties in the Atlanta MSA, all of which are located in Georgia. These counties are Barrow, Bartow, Butts, Carroll, Cherokee, Clayton, Cobb, Coweta, Dawson, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Haralson, Heard, Henry, Jasper, Lamar, Meriwether, Newton, Paulding, Pickens, Pike, Rockdale, Spalding, and Walton. These counties are outlined in **Appendix Figure 2** below.

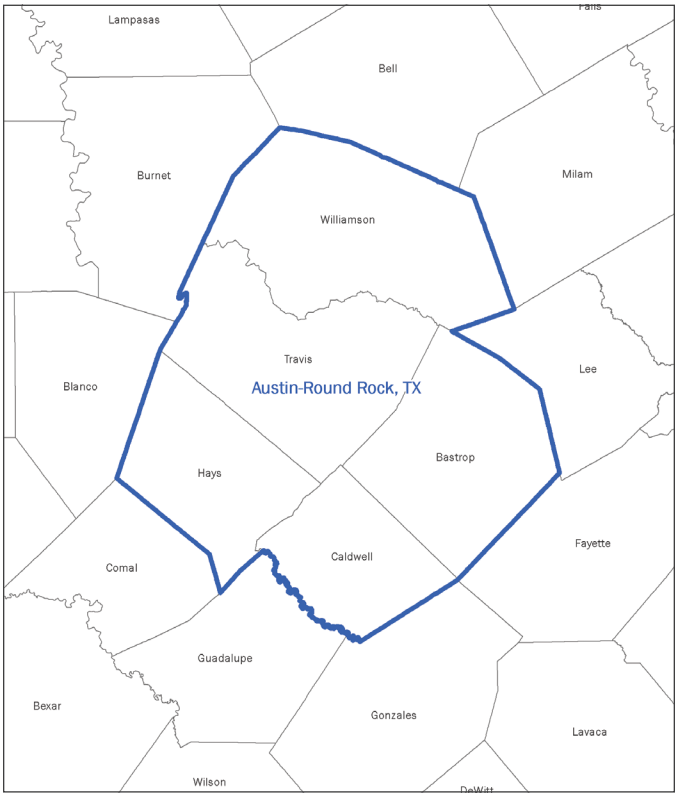
Appendix Figure 2 The Atlanta Metropolitan Statistical Area



3. Austin

The Austin MSA has a population of 1,835,110 as of 2012, of which an estimated 49.9% are female. It has a median income of $59,433. Regarding education, 40.3% of the age 25 and over population have a bachelor's degree or above. There are 19 hospitals, which are divided among 8 healthcare networks or systems. There are five counties in the Austin MSA, all of which are located in Texas. These counties are Bastrop, Caldwell, Hays, Travis, and Williamson and are outlined in **Appendix Figure 3** below.

Appendix Figure 3 The Austin Metropolitan Statistical Area



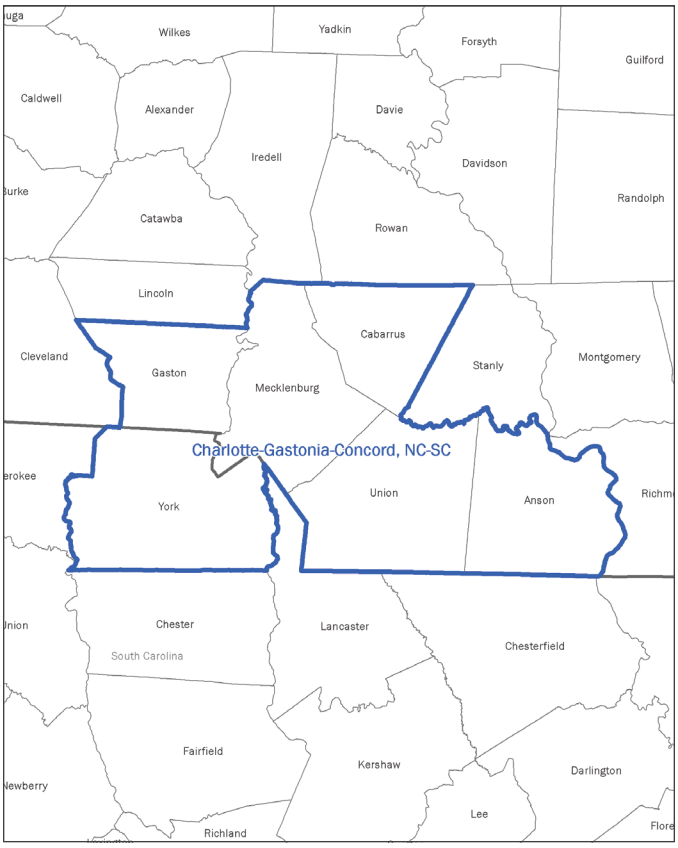
4. Charlotte

The Charlotte MSA has a population of 1,829,608 as of 2012, of which an estimated 51.4% are female. It has a median income of $52,470. Regarding education, 33.1% of the age 25 and over population have a bachelor's degree or above. There are 11 hospitals, which are divided among four healthcare networks or systems. There are six counties in the Charlotte MSA, five of which are in North Carolina and one in South Carolina. The five counties in North Carolina are Anson, Cabarrus, Gaston, Mecklenburg, and Union. The one county in South Carolina is York. The counties are outlined in **Appendix Figure 4** below.

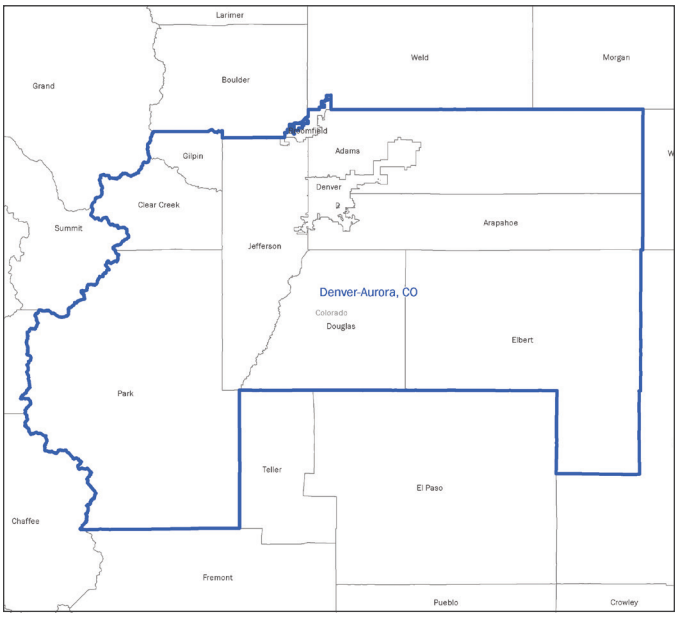
5. Denver

The Denver MSA has a population of 2,646,694 as of 2012, of which an estimated 50.3% are female. It has a median income of $61,453. Regarding education, 39.0% of age the 25 and over population have a bachelor's degree or above. There are 16 hospitals, which are divided among seven healthcare networks or systems. There are 10 counties in the Denver MSA, all of which are located in Colorado. The 10 counties are Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, and Park and are outlined in **Appendix Figure 5** below.

Appendix Figure 4 The Charlotte Metropolitan Statistical Area



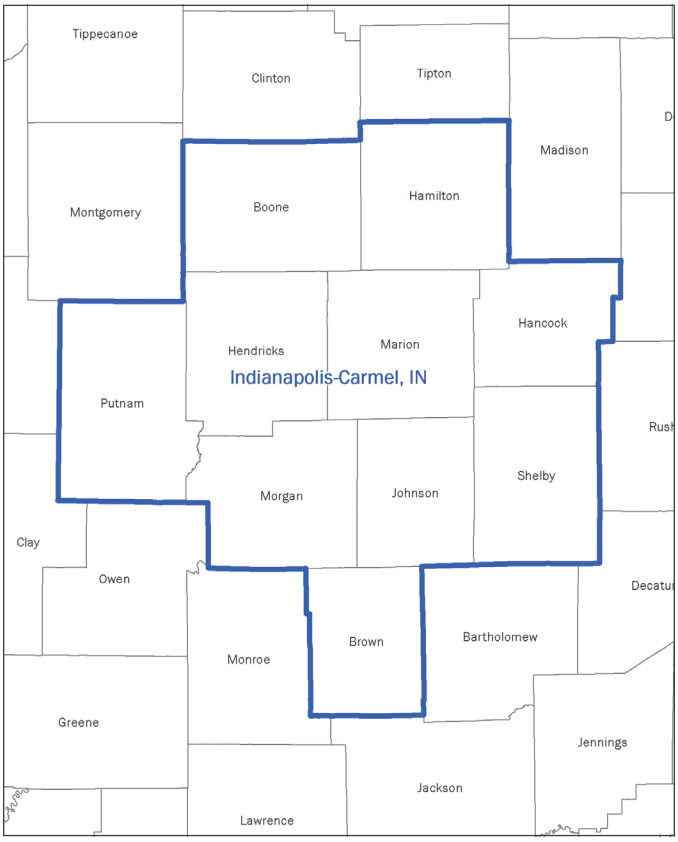
Appendix Figure 5 The Denver Metropolitan Statistical Area



6. Indianapolis

The Indianapolis MSA has a population of 1,798,896 as of 2012, of which an estimated 51.2% are female. It has a median income of $51,808. Regarding education, 31.3% of the age 25 and over population have a bachelor's degree or above. There are 21 hospitals, which are divided among 12 healthcare networks or systems. There are 10 counties in the Indianapolis MSA, all of which are located in Indiana. The 10 counties are Boone, Brown, Hamilton, Hancock, Hendricks, Johnson, Marion, Morgan, Putnam, and Shelby and are outlined in **Appendix Figure 6** below.

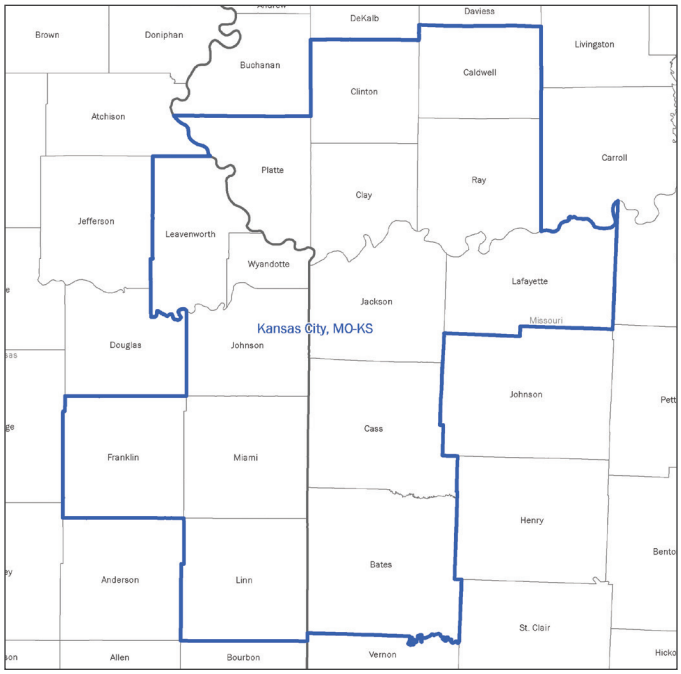
Appendix Figure 6 The Indianapolis Metropolitan Statistical Area



7. Kansas City

The Kansas City MSA has a population of 2,064,525 as of 2012, of which an estimated 51.1% are female. It has a median income of $54,519. Regarding education, 32.9% of the age 25 and over population have a bachelor's degree or above. There are 31 hospitals, which are divided among 18 healthcare networks or systems. There are 15 counties in the Kansas City MSA, nine of which are in Missouri and six in Kansas. The nine counties in Missouri are Bates, Caldwell, Cass, Clay, Clinton, Jackson, Lafayette, Platte, and Ray. The six counties in Kansas are Franklin, Johnson, Leavenworth, Linn, Miami, and Wyandotte and are outlined in **Appendix Figure 7** below.

Appendix Figure 7 The Kansas City Metropolitan Statistical Area



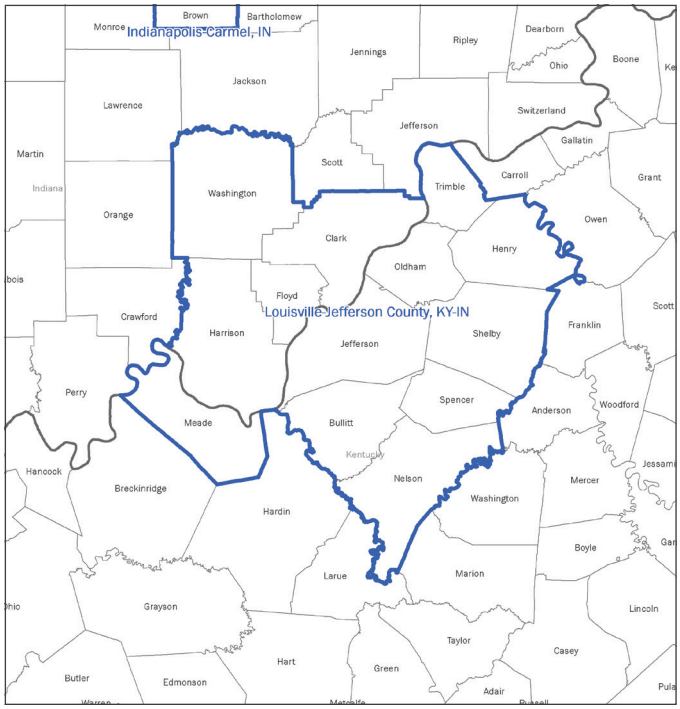
8. Louisville

The Louisville MSA has a population of 1,301,271 as of 2012, of which an estimated 51.2% are female. It has a median income of $48,895. Regarding education, 25.7% of the age 25 and over population have a bachelor's degree or above. There are 17 hospitals, which are divided among 10 healthcare networks or systems. There are 13 counties in the Louisville MSA, nine of which are in Kentucky and four of which are in Indiana. The nine counties in Kentucky are Bullitt, Henry, Jefferson, Meade, Nelson, Oldham, Shelby, Spencer, and Trimble. The four counties in Indiana are Clark, Floyd, Harrison, and Washington and are outlined in **Appendix Figure 8** below.

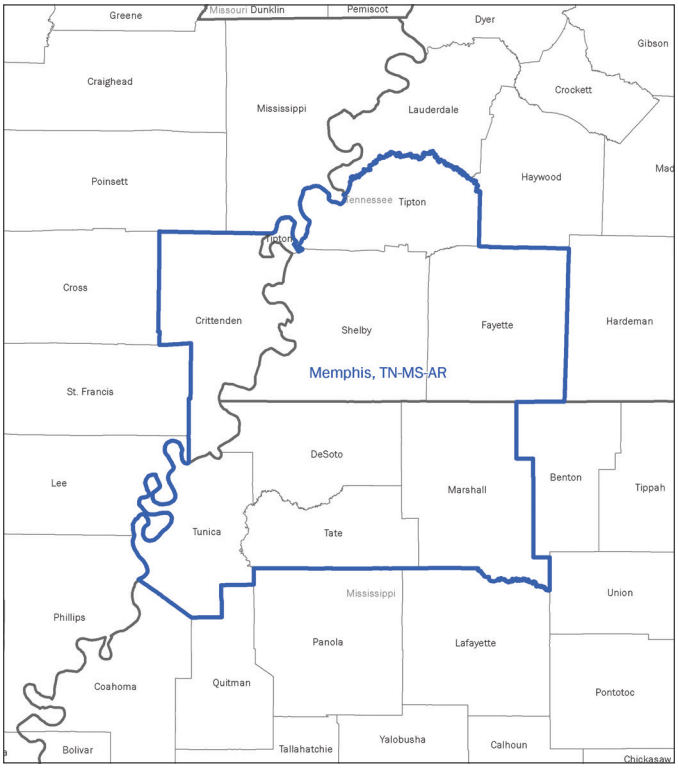
9. Memphis

The Memphis MSA has a population of 1,332,026 as of 2012, of which an estimated 52% are female. It has a median income of $45,687. Regarding education, 25.6% of the age 25 and over population have a bachelor's degree or above. There are 13 hospitals, which are divided among eight healthcare networks or systems. There are eight counties in the Memphis MSA, four of which are in Mississippi, three in Tennessee, and one in Arkansas. The four counties in Mississippi are DeSoto, Marshall, Tate, and Tunica. The three counties in Tennessee are Fayette, Shelby, and Tipton. The one county in Arkansas is Crittenden. The counties are outlined in **Appendix Figure 9** below.

Appendix Figure 8 The Louisville Metropolitan Statistical Area



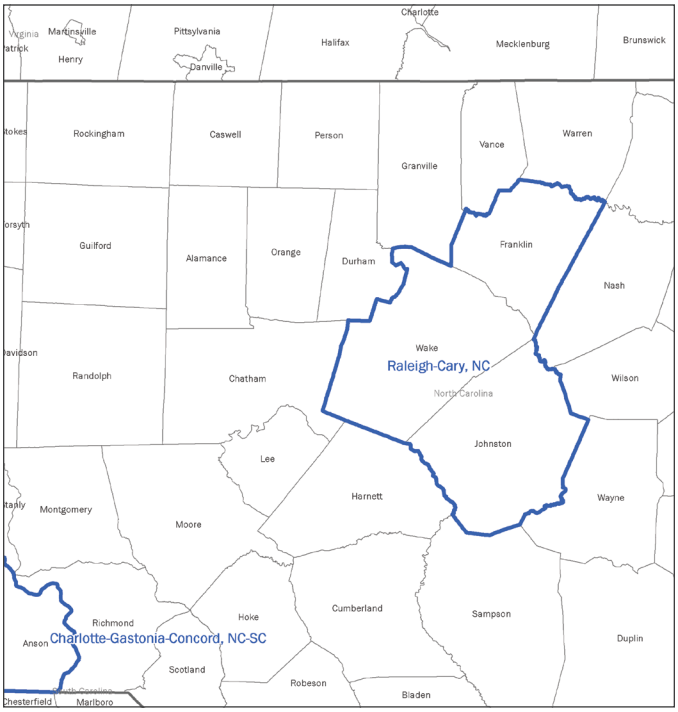
Appendix Figure 9 The Memphis Metropolitan Statistical Area



10. Raleigh

The Raleigh MSA has a population of 1,188,504 as of 2012, of which an estimated 51.1% are female. It has a median income of $60,319. Regarding education, 41.9% of the age 25 and over population have a bachelor's degree or above. There are six hospitals, which are divided among five healthcare networks or systems. There are three counties in the Raleigh MSA, all of which are located in North Carolina. These counties are Franklin, Johnston, and Wake and are outlined in **Appendix Figure 10** below.

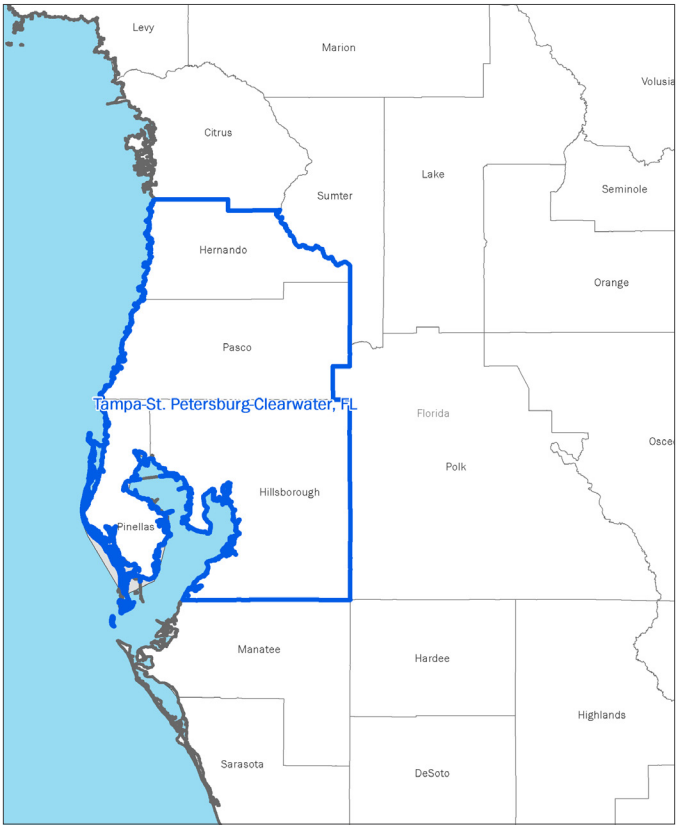
Appendix Figure 10 The Raleigh Metropolitan Statistical Area



11. Tampa

The Tampa MSA has a population of 2,845,178 as of 2012, of which an estimated 51.6% are female. It has a median income of $44,402. Regarding education, 26.2% of the age 25 and over population have a bachelor's degree or above. There are 29 hospitals, which are divided among eight healthcare networks or systems. There are four counties in the Tampa MSA, all of which are all located in Florida. These counties are Hernando, Hillsborough, Pasco, and Pinellas and are outlined in **Appendix Figure 11** below.

Appendix Figure 11 The Tampa Metropolitan Statistical Area



B. Data

1. Physician Supply Analysis

The physician supply analysis was performed using the National Plan & Provider Enumeration System's (NPPES) National Provider Identification (NPI) October 2014 Physician Dataset provided by the Centers for Medicare & Medicaid Services (CMS).[1] The NPI is a unique 10-digit code assigned by CMS to every healthcare provider in the United States (more than 3,000,000 providers, which are both organizations and individuals). The dataset is updated monthly.[2] The NPI number first assigned to providers in 2006 to unify claims across billing and electronic transactions. The Center has developed techniques to extract a count of more than 900,000 practicing physicians in the United States and to determine their specialty using the provider taxonomy definitions provided by the National Uniform Claim Committee (NUCC).[3]

We use the NPI data to determine a count of physicians by region and specialty. We first aggregate the number of physicians located in each U.S. ZIP code area by their recorded specialty. Next, we link these ZIP code figures to the respective counties before linking counties to an MSA.[4] Once our physician supply has been aggregated to the MSA level, we use the 2010 U.S. Census Bureau population data to determine the per capita supply of physicians by specialty. In order to provide a more appreciable measure of physician supply, per capita values have been adjusted to represent the number of physicians per 100,000 residents rather than the number of physicians per resident. This analysis was centered on those physicians practicing only within a Metropolitan Statistical Area. We use the 2013 Health Resources and Services Administration's Area Health Resources File Database to determine physician supply over time.[5] 2013 is the most current data available. We again use U.S. Census Bureau population data in calculating physician per capita over time.

2. Commercial Claims Sample: Population Coverage Rate

The commercial claims dataset varies in its coverage of the population in each MSA; the enrollee[6] population is a sample of the entire commercially insured population. The sample may vary from year to year based on the insurance companies in the data.[7] The database used contains private sector health insurance information for approximately 45 million covered individuals nationwide, or roughly 14% of the U.S. population. Fifty-four percent of the U.S. population is commercially insured [8] (approximately 171 million people). In other words, the database used in our analysis contains information on 26% of the commercially insured population.[9]

From 2010-2012, 24%-26% of the Nashville under age 65 population is represented in the commercial claims database. This is in the middle of the coverage range for our peer group MSAs, as seen in **Appendix Figure 12**.[10] Indianapolis has the highest coverage rate, while Tampa, Kansas City, and Denver have lower coverage rates. Indianapolis' coverage rate drops in 2012; Nashville's increases from 2010 to 2011 and stays relatively constant from 2011 to 2012.

1 Population estimates were obtained from the U.S. Census Bureau's Metropolitan Statistical Area population figures.

2 See: **https://nppes.cms.hhs.gov/NPPESRegistry/NPIRegistryHome.do**.

3 For more information about the taxonomy dataset, see: **http://www.nucc.org/index.php?option=com_content&view=article&id=14&Itemid=125**.

4 We use the "HUD USPS ZIP Code Crosswalk Files" (**http://www.huduser.org/portal/datasets/usps_crosswalk.html**) to link ZIP codes to the county where that ZIP code has the most addresses.

5 The Area Health Resources Files database is available at: **http://ahrf.hrsa.gov/**.

6 An enrollee is defined as an individual who receives healthcare under an insurance plan. In the commercial claims database, enrollees can be employees, spouses, and dependents who are enrolled in a benefit plan (also known as "covered lives").

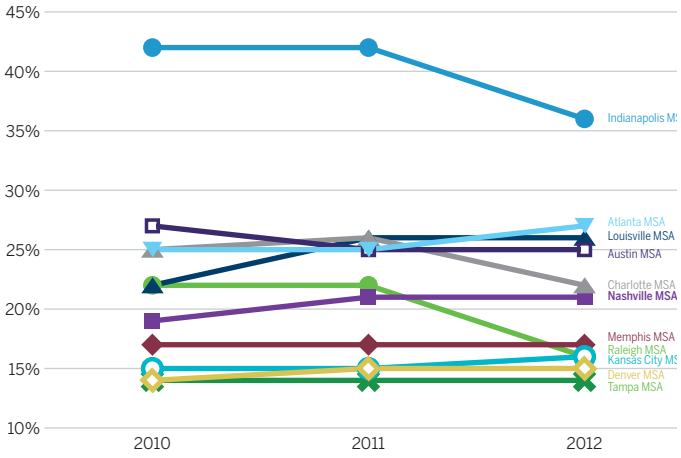
7 Truven's MarketScan® Commercial Claims and Encounter Research Database includes a sample of claims of commercially insured patients and their families seeking treatment across the United States. It contains information about diagnoses, procedures, and payments. Although the commercial claims sample we use in our analysis is not nationally representative, it generally is thought to be largely representative of working age employees with commercial insurance. The commercial claims data are compiled by Truven through contracts with insurance companies across the nation.

8 Kaiser Family Foundation, Health Insurance Coverage of the Total Population, **http://kff.org/other/state-indicator/total-population/**.

9 Our analysis uses the percent of people with insurance, including Medicaid, in the denominator.

10 This analysis was constructed using two data sources: the Commercial Claims Enrollment File and Census Small Area Health Insurance Estimates. We divide the number of enrollees in the commercial claims enrollment file by the number of individuals with health insurance in the small area health insurance files. We are not able to break out Medicaid enrollees from the insured population because there is no consistent source of counts at the national, county, or MSA level for Medicaid enrollees.

Appendix Figure 12 Percentage of Enrollees Contained in the Commercial Claims Data, Age 65 and Below



Source: Authors' calculations using U.S. Census Bureau's Small Area Health Insurance Estimates and 2010-2012 Truven Enrollment file

3. Commercial Claims Sample: Healthcare Utilization

The commercial claims healthcare utilization analysis is based on the 2012 inpatient and outpatient service-level files. Information for patients who are not listed in the enrollment files is excluded from the analysis. Information also is excluded if the enrollee identifier variable is missing. Office visits were determined by the standard place of service variable. Emergency Department (ED) visits were determined based on the standard place of service variable and the services category variable. Physician specialty was determined by the specialty variable. Utilization statistics were generated based on the number of enrollees and the number receiving any service (at least one) in either an inpatient and/or an outpatient setting.

4. Commercial Claims Sample: Healthcare Costs

The cost analysis presents average payments by MSA. Observations that appear to include coding errors are dropped.[11] Coinsurance, copay, and deductible are presented. Copay reflects payments where a patient pays a fixed rate for a certain service. Coinsurance reflects payments where the patient pays a percentage of the insurance negotiated rate. Deductible payments are payments coming from the patient deductible. We also present "Net Payment," the average payment that the insurance company pays for a service. Not all visits will have a copay, coinsurance, deductible, or coinsurance payment. The averages are presented for visits with a non-zero value for the payment type. For example, if a visit does not a have coinsurance payment, it is not included in the denominator for the average coinsurance per visit analysis.

11 Specifically, we drop observations that have negative lengths of stay, missing patient ID, and capitated payments. We drop capitated payments since these visits do not include accurate cost of care data.

C. Overview of Health Rankings and Community Health Needs Assessments

In conducting our analyses, we reviewed metrics and information provided in several commonly reported comparative rankings of various health and healthcare measures across communities. These rankings address healthcare and health behaviors, socio-economic factors and environmental factors associated with population health. Included among the most frequently cited of those are The Commonwealth Fund's *Scorecard on Local Health System Performance*, the *University of Wisconsin's County Health Rankings & Roadmaps,* and the *Dartmouth Atlas of Healthcare*.[12] These sources present data and information on local geographies at Hospital Referral Regions (HRR), counties, and HRRs, respectively.[13] We also examined recent reports from the 2014 United Health Foundation's America's Health Rankings and the 2014 Commonwealth Fund's *Scorecard on State Health System Performance*.[14]

Each of these rankings and scorecards includes some of the same measures or categories of measures used in this pilot project. Included among the common categories are: access, cost (or affordability), health outcomes, and health behaviors. There also are some common measures, most notably those related to several chronic conditions and healthy behaviors such as obesity that rely on BRFSS data.

Some of these reports provide data on a systematic basis over time for specific areas within a given state, but some such as the America's Health Rankings provide data or scorecards only at the state level. In addition, some of the underlying data presented in The Commonwealth Fund report, for example, are at the HRR level only. While these may provide some insight into the broader Nashville region, they make comparisons with other metro areas — which may have far broader or narrower — HRRs — more complicated. MSAs can provide a better and more comprehensive measure for this reason given that data are more systematically reported at the MSA level for both healthcare data and for other economic and environmental data.

12 For more information, see The Commonwealth Fund (**http://www.commonwealthfund.org/**), "Rising to the Challenge Results from a Scorecard on Local Health System Performance" (**http://www.commonwealthfund.org/~/media/files/publications/fund-report/2012/mar/local scorecard/1578_commission_rising_to_challenge_local_scorecard_2012_finalv2.pdf**); University of Wisconsin County Health Rankings (**http://www.countyhealthrankings.org/**), "How Healthy Is Your County?" County Health Rankings & Roadmaps. The University of Wisconsin and the Robert Wood Johnson Foundation (**http://www.countyhealthrankings.org/**); and the Dartmouth Atlas (**http://www.dartmouthatlas.org/**).

13 HRRs are defined based on Medicare data and tend to be substantially larger than MSAs and may include more than one MSA within the defined HRR area. In general, the reliability of the data presented may vary across the reports depending on the sample size for the geography.

14 *America's Health Rankings 2014*, United Health Foundation (**http://www.americashealthrankings.org/reports/annual**) and *Scorecard on State Health System Performance, 2014*, The Commonwealth Fund (**http://www.commonwealthfund.org/publications/fund-reports/2014/apr/2014-state-scorecard**).

There are a number of differences between these scorecards and rankings other than the specific geographies studied that can result in different rankings for the Nashville region or for the state – these include the specific metrics or measures employed and the weights given to specific measures. Many of these data sources tend to rely on Medicare data for costs and certain utilization measures and use different measures; this can result in different relative values and rankings from information based on commercially insured populations.

For example, The Commonwealth Fund's *Scorecard on Local Health System Performance* tracks 43 indicators in four dimensions; including:

- **Access:** No care because of cost, high out-of-pocket medical costs, routine visit in past two years, dental visit in past year;
- **Prevention and treatment:** Usual source of care, age 50+ recommended screenings, children with a medical home, children with medical and dental visits in past year, children who received mental healthcare in past year, Medicare beneficiaries who received improper medications, Medicare beneficiaries who received contraindicated medications, Medicare Fee-for-Service patients with receptive and respectful providers, Medicare beneficiaries with risk-adjusted 30-day mortality for heart attack/failure and pneumonia, hospitalized patients properly informed on home recovery, hospitalized patients who experience satisfactory pain management, home health patients who get better mobility, home health patients whose wounds improved or healed following operation, high-risk nursing home residents with pressure sores, and long-stay nursing residents with anti-psychotic medications;
- **Potentially avoidable hospital use and cost:** Pediatric asthma admissions per 100,000, Medicare beneficiaries with ambulatory care sensitive condition (ACSC) coverage ages 65-74 per 1,000, Medicare beneficiaries with ACSC coverage age 75+ per 1,000, short stay nursing home residents readmitted within 30 days of discharge, percent of long stay nursing home residents hospitalized within a six-month period, percent of home health patients also enrolled in Medicare with a hospital administration, potentially avoidable ED visits per 1,000 Medicare beneficiaries, total single premium per enrolled employee at private sector establishments, and total Medicare reimbursements per enrollee; and
- **Healthy lives:** Deaths per 100,000, years of life lost (YLL) pre-age 75, breast cancer deaths per 100,000, colorectal cancer deaths per 100,000, suicides per 100,000, adults age 18-64 who report fair/poor health or activity limitations, childhood obesity, and adults age 18-64 who lost six or more teeth because of decay, infection, or disease.

In comparison, the County Health Rankings for Davidson County, Tennessee includes five broad categories aggregated into two categories of health outcomes and health factors that are used in determining a region's ranking on health outcomes and health factors:

- **Health Outcomes:** Length of life and quality of life (Premature death)
- **Health Factors**: Healthy behaviors (smoking, drinking, obesity, physical inactivity, exercise opportunities, food environment index, sexually transmitted infections, alcohol-impaired driving deaths, teen births); clinical care (uninsured, primary care physicians, dentists, mental health providers, preventable hospital stays, diabetic screening, mammography screening); social and economic factors (high school graduation, college, unemployment, child poverty, inadequate social support, children in single-parent households, violent crime, injury deaths); and physical environment (air pollution, drinking water violations, severe housing problems, driving alone to work, long commute time)

There are differences in methods for scoring, and for combining together the individual measures into aggregate measures. For example, *County Health Rankings* reports two measures of Health Outcomes and Health Factors and provides a comparison on the individual county with other counties in the state. Davidson County ranked higher among Tennessee counties for Health Outcomes (13th out of 95) and somewhat lower for Health Factors (which reflect chronic conditions) (24th out of 95).

In comparison, The Commonwealth Fund provides rankings across metro areas for each of its four categories and then aggregates them into a weighted measure of overall performance. This can lead to differences in relative rankings and make it more difficult to ascertain relationships between the underlying factors and the performance of a region. We note, for example, that Nashville performs relatively well on Access and Affordability in The Commonwealth Fund, which is similar to our findings of relative costs and availability of physicians and hospitals; however, the measures presented in our report are more specific to the population and utilization of specific services and by type.

A recent Institute of Medicine report addresses the issue of identifying "core" metrics to assess the health of individuals and the performance of certain segments of the healthcare delivery system for a variety of different purposes.[15] The report identified 15 core measures grouped into four domains: Healthy People, Care Quality, Care Cost, and Engaged People.[16] While the measures are identified as important factors that impact population level health, the report does not advocate for a specific set of metrics that are representative of each measure. The report contains the "Best Current Measure" for each of the 15 core measures, reported in **Appendix Table 2** on the next page, along with a measure of "national performance;" many of these measures are available only at the state level or rely on data that has no standardized collection process or may not be collected regularly.[17] As noted previously, our analyses include key elements and best available measures to make use of best available data in several of these categories for comparison purposes across the Nashville MSA and its peer MSAs.

15 Institute of Medicine, 2015, *Vital signs: Core metrics for health and health care progress,* Washington, D.C.: The National Academies Press.

16 Measures within each domain are as follows: *Healthy people:* Life expectancy, well-being, overweight and obesity, addictive behavior, unintended pregnancy, healthy communities; *Care quality*: Preventive services, care access, patient safety, evidence-based care, care match with patient goals; *Care cost*: Personal spending burden, sustainability; *Engaged people:* Individual engagement, community engagement.

17 Institute of Medicine, 2015, *Vital signs: Core metrics for health and health care progress,* Washington, D.C.: The National Academies Press, pp. 4-3 and 4-5.

Appendix Table 2 IOM Core Measure Set

Domain	Key Element	Core Measure Focus	Best Current Measure	Current National Performance
Healthy People	Length of Life	Life Expectancy	Life expectancy at birth	79 year life expectancy at birth
	Quality of Life	Wellbeing	Self-reported health	66% report being healthy
	Healthy Behaviors	Overweight and Obesity	Body mass index	69% of adults with BMI >25
		Addictive Behavior	Addiction death rate	200 addiction deaths per 100,000, age 15+
		Unintended Pregnancy	Teen pregnancy rate	27 births per 1,000 females aged 15 to 19
	Healthy Social Circumstances	Healthy Communities	High school graduation rate	80% graduate in 4 years
Care Quality	Prevention	Preventive Services	Childhood immunization rate	68% of children vaccinated by age 3
	Access to Care	Care Access	Unmet care need	5% report unmet medical needs
	Safe Care	Patient Safety	Hospital acquired infection rate	1,700 HAIs per 100,000 admissions
	Appropriate Treatment	Evidence-Based Care	Preventable hospitalization rate	10,000 avoidable per 100,000 admissions
	Person-Centered Care	Care Match with Patient Goals	Patient-clinician communication satisfaction	92% satisfied with provider communication
Care Cost	Affordability	Personal Spending Burden	High spending relative to income	46% spent >10% income on care, or uninsured in 2012
	Sustainability	Population Spending Burden	Per capita expenditures on health care	$9,000 health care expenditure per capita
Engaged People	Individual Engagement	Individual Engagement	Health literacy rate	12% proficient health literary
	Community Engagement	Community Engagement	Social support	21% inadequate social support

Source: Adapted from the Institute of Medicine's *Vital Signs: Core Metrics for Health and Health Care Progress*, Table S1-Core Measure Set. Available online at: **http://www.iom.edu/Reports/2015/Vital-Signs-Core-Metrics.aspx**

There have been several additional detailed and broader reviews and assessments of health in the Nashville region, that provide insight into these metrics and additional data and information on environmental and socio-economic factors, and some trend data. These include the Davidson County *Community Health Needs Assessment*, a collaborative effort led by The Saint Thomas Health Community Benefit Task Force; along with Baptist Hospital, St. Thomas Hospital, and The Hospital for Spinal Surgery;[18] the Vanderbilt Community Hospitals and Clinics *Community Health Needs Assessment*, prepared by the Vanderbilt University Hospital, the Monroe Carell Jr. Children's Hospital at Vanderbilt, and the Vanderbilt Psychiatric Hospital (Vanderbilt University Medical Center (VUMC)); VUMC's CNHA provides an assessment of eight specific topics on the health of Tennessee and the Nashville area,[19] and the recent Community Health Profile of Metro Nashville-Davidson County conducted by the Metro Public Health Department.[20] The Community Health Profile drew upon 11 different stakeholder groups in the area; and collected and presented comprehensive information and data on a wide variety of metrics in demographics, well-being, and environment (including, for example, access to public transportation and insurance and basic forms of healthcare such as dental care).

While there is variation in the geographies and the specifics studied in each of these three studies, they provide rich and complementary information about the broader socio-economic and environmental factors affecting healthcare and healthcare delivery and access in the region, and provide extensive information on providers and resources. Across the three studies, there are common themes with regard to healthcare conditions and issues and those factors requiring further study or potential high priority areas for effective intervention. They each suggest the need for strong community engagement in addressing healthcare issues. There also is significant overlap with stakeholders in this pilot study.

18 Baptist Hospital, St. Thomas Hospital, and Hospital for Spinal Surgery. *Davidson County Community Health Needs Assessment.* 2013.

19 Vanderbilt Community Hospitals and Clinics. *Community Health Needs Assessment.* 2013. The Nashville area is defined by four specific counties for this assessment, Davidson, Montgomery, Rutherford, and Williamson.

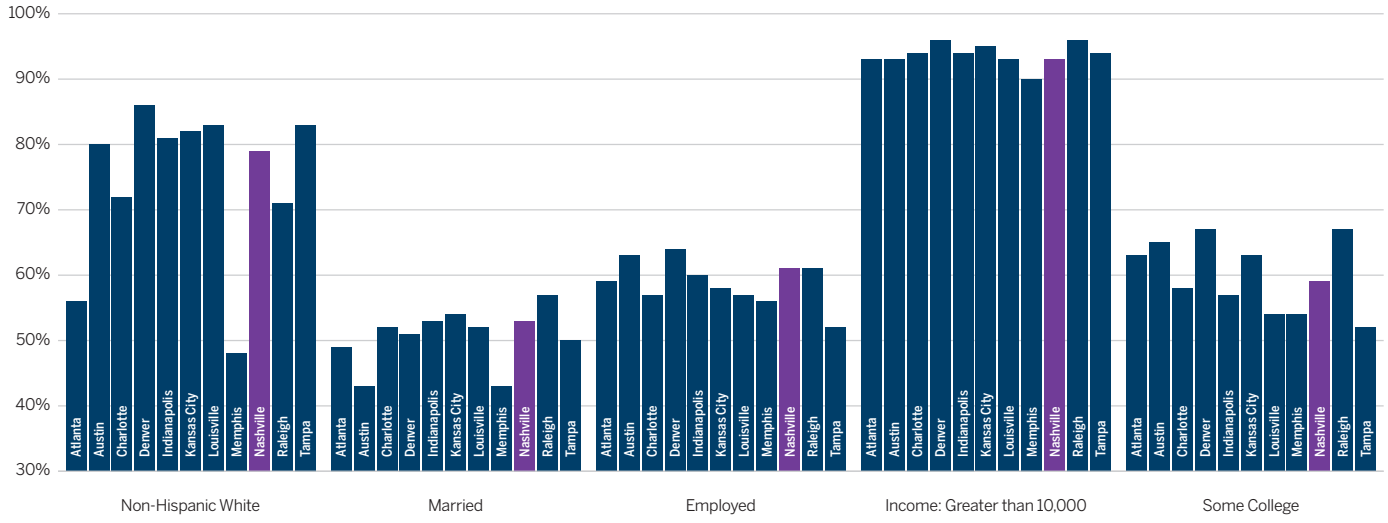
20 Vick, J. and Sandra Thomas-Trudo. Community Health Profiles: 2014. Metro Nashville Public Health Department, Division of Epidemiology and Research (2014), available at **http://www.nashville.gov/Portals/0/SiteContent/Health/PDFs/HealthData/CommunityHealthStatus/CommunityHealthStatusProfileReportForMetroNashville2014.pdf**.

D. Methodology

1. Population Level Health: Sample Comparison

The matching process we use to create demographic-adjusted health metrics employs an algorithm that identifies matches based on race, employment status, income, education, age, and the gender of the individual. The synthetic sample created by the matching process produces a more demographically homogenous population. As depicted in **Appendix Figure 13** below, there is significant variation in core demographic factors, with the most extreme represented in race.

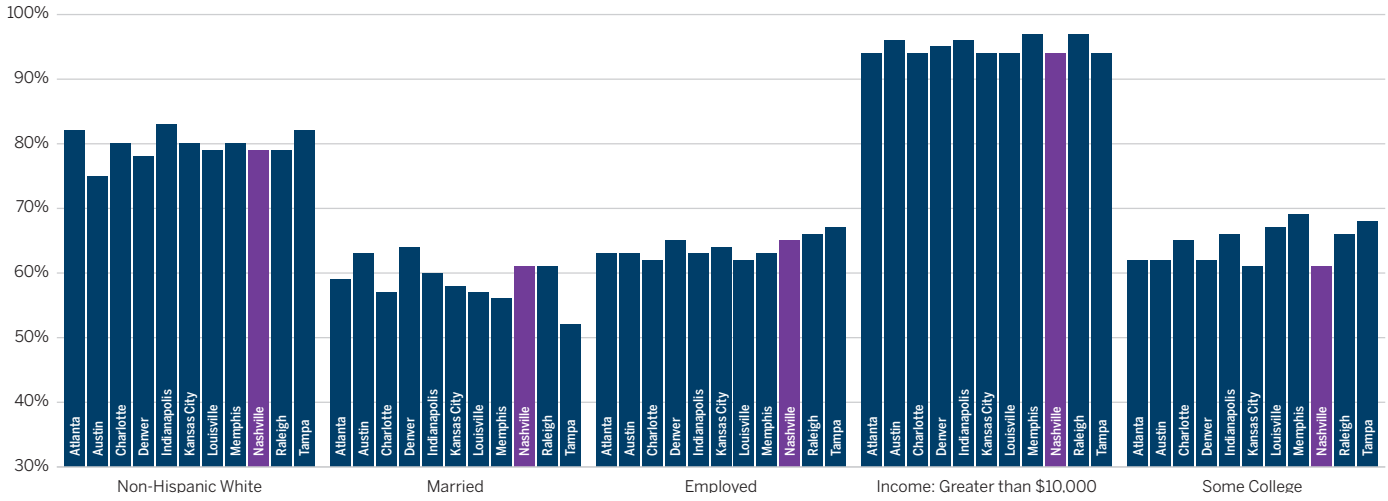
Appendix Figure 13 MSA-Level Demographics (Original), 2012



Source: Authors' calculations using the Centers for Disease Control and Prevention, BRFSS SMART Data, 2012

Appendix Figure 14 presents the average demographics in this synthetic sample and demonstrates that the matching process resulted in a sample that more closely mirrors that in Nashville in terms of demographic composition.

Appendix Figure 14 MSA-Level Demographics (Matched), 2012



Source: Authors' calculations using the Centers for Disease Control and Prevention, BRFSS SMART Data, 2012

2. Methodology for Identifying Chronic Conditions in the Commercial Claims Data

CMS algorithms and definitions are used to flag patients with chronic conditions.[21] CMS Chronic Conditions Warehouse provides information on 27 chronic condition definitions that specify which diagnosis codes identify a patient as having one or more of these conditions. Patients are flagged as having a condition based on inpatient (IP) and outpatient (OP) claims.[22]

Patients may be counted in more than one chronic condition category. Once patients are identified to have a certain condition, the prevalence rate is calculated. The prevalence rate is the percentage of the enrollment population that is affected with a condition at a given time. The denominator is the number of patients in the enrollment file who appear in the claims file.

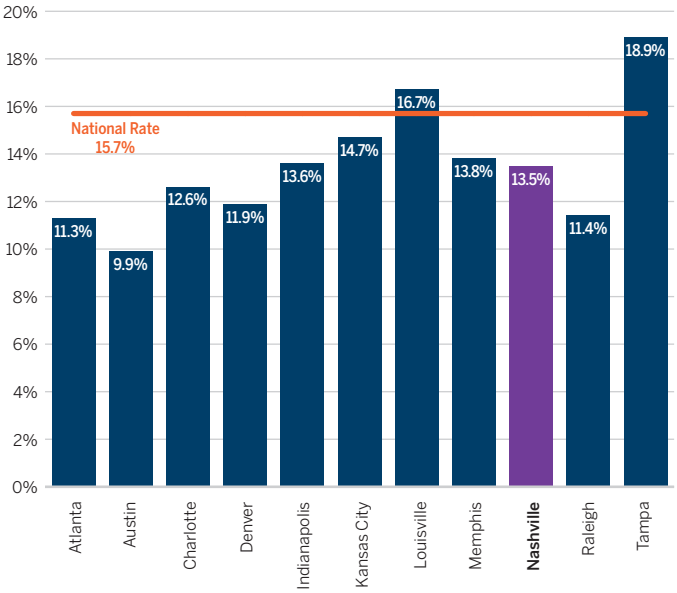
3. Hospital Quality Scoring Methodology (HVBP Fiscal Year 2014)

Hospital Value-Based Purchasing (HVBP) scores reported in the CMS Hospital Compare database were used to assess quality of care at the hospital level.[23] Hospitals are evaluated on performance scores in three domains. For our aggregate analysis, we used the hospital domain scores for each geography and reported the percentage of beds in the MSA above and below the national average. National-level aggregates are weighted by bed size.

E. Access

In 2012, 13.5% of the Nashville population was insured through Medicare as depicted in **Appendix Figure 15**. This is lower than the national rate. Fewer than half of the peer MSAs had a smaller population-adjusted share of Medicare beneficiaries. As coverage is dependent on age, the variation reflects the different age distributions in each MSA.

Appendix Figure 15 Medicare Insurance Coverage Rate as a Percent of Population across the 11 MSAs, 2012



Source: Authors' calculations using CMS Medicare Advantage County Penetration and 2012 Census Population Estimates

Appendix Figure 16 and **Appendix Figure 17** present data on the supply of Family Medicine and Internal Medicine physicians. While the aggregate physician supply in Nashville is strong, the supply of Family Medicine physicians is below average. With 24 Family Medicine physicians per 100,000 residents, Nashville has substantially fewer Family Medicine physicians than in peer MSAs. The supply of Family Medicine physicians in the Nashville MSA is similar to that of Atlanta (24 Family Medicine physicians per 100,000 residents) but is greater than that of Memphis, which has only 22 Family Medicine physicians per 100,000 people. The lower supply of family medicine practitioners is somewhat moderated by the relatively high supply of internists in the Nashville MSA (see **Appendix Figure 17**).

Nashville's supply of Internal Medicine physicians is above average, with 90 physicians per 100,000 residents. Only the Indianapolis MSA has a greater supply of physicians focusing on internal medicine, with 93 physicians per 100,000. Patients may respond to the lower supply of primary care doctors by visiting Internists rather than Family Medicine practitioners.[24] If Internal Medicine physicians and Family Medicine physicians are categorized as primary care providers (PCPs), Nashville has a supply of 114 PCPs per 100,000. This is on par with the national average of 112 physicians per 100,000 (see **Appendix Figure 18**); Nashville's aggregate supply of Internists and Family Medicine physicians is greater than many of its peer MSAs.

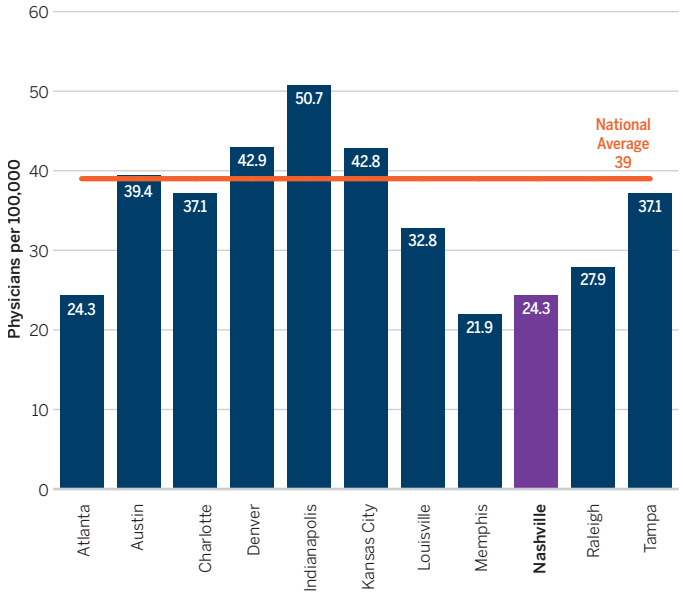
21 Chronic Conditions Data Warehouse. "Condition Categories." For more information, see **https://ccwdata.org/web/guest/condition-categories**

22 Detailed information regarding the methodology we employ is available upon request.

23 The publicly reported HVBP scores are available at: **http://www.medicare.gov/hospitalcompare/data/total-performance-scores.html**. Our analysis uses scores as of 12/17/2014.

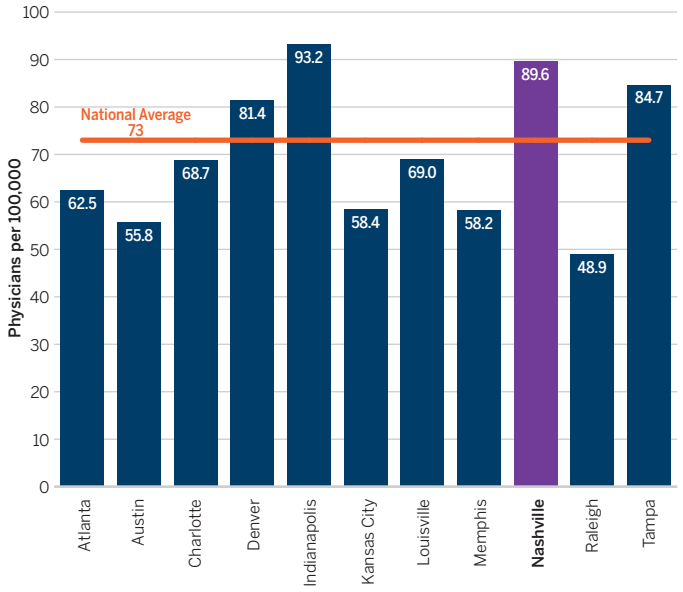
24 Internists regularly provide primary care. For example, see Petterson, Stephen, Winston Liaw, Robert Phillips, David Rabin, David Meyers, and Andrew Bazemore, *Projecting US Primary Care Physician Workforce Needs: 2005-2025*. Annals of Family Medicine, 2012; 10: 503-509.

Appendix Figure 16 Family Medicine Physicians per 100,000 by Metropolitan Statistical Area



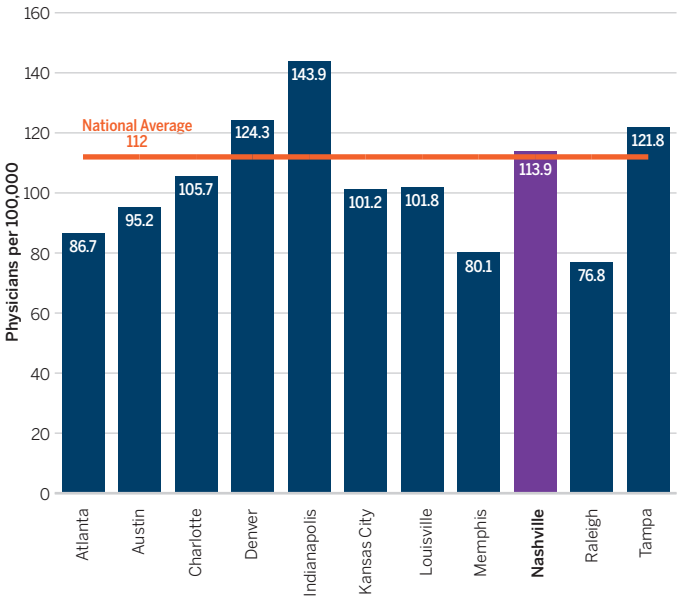
Source: Authors' calculations using the Centers for Medicare & Medicaid Services NPPES NPI Dataset, 2014 for physician count (numerator); 2010 Census population from the 2013 U.S. Census Bureau's Metropolitan and Micropolitan Statistical Area Population and Estimated Components of Change Data for population (denominator)

Appendix Figure 17 Internal Medicine Physicians per 100,000 by Metropolitan Statistical Area



Source: Authors' calculations using the Centers for Medicare & Medicaid Services NPPES NPI Dataset, 2014 for physician count (numerator); 2010 Census population from the 2013 U.S. Census Bureau's Metropolitan and Micropolitan Statistical Area Population and Estimated Components of Change Data for population (denominator)

Appendix Figure 18 Internal and Family Medicine Physicians per 100,000 by Metropolitan Statistical Area



Source: Authors' calculations using the Centers for Medicare & Medicaid Services NPPES NPI Dataset, 2014 for physician count (numerator); 2010 Census population from the 2013 U.S. Census Bureau's Metropolitan and Micropolitan Statistical Area Population and Estimated Components of Change Data for population (denominator)

F. Cost

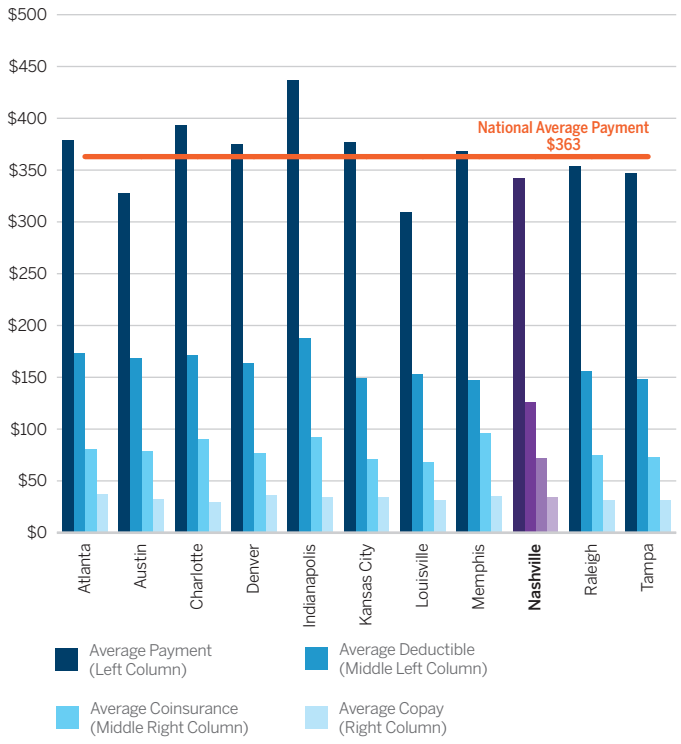
Appendix Figure 19 presents the results of our commercially insured outpatient payments analysis. This includes outpatient procedures, including hospital visits that did not require an overnight stay,[25] outpatient surgery, emergency department visits, and standard doctor office visits. In 2012, outpatient visits in the Nashville MSA had an average cost of $342 per visit.

Average cost for an outpatient visit is highest in the Indianapolis MSA at $437 and lowest in the Louisville MSA at $309. Insurance companies, on average, paid $275 per outpatient visit where the average ranges from $234 to $349 in peer MSAs. Average patients' deductible was $126, the lowest in the peer MSAs range of $126-$189. Average copay was $34 in a peer MSA range of $29-$37. Average coinsurance was $72 compared with a peer MSA range of $68-$96.[26]

25 Overnight stays are identified as claims that have a room and board charge.

26 Averages are computed for claims that were subject to deductible, copay, or coinsurance. If a claim did not have any portion of the payment due from the patient, it was excluded from the average calculation.

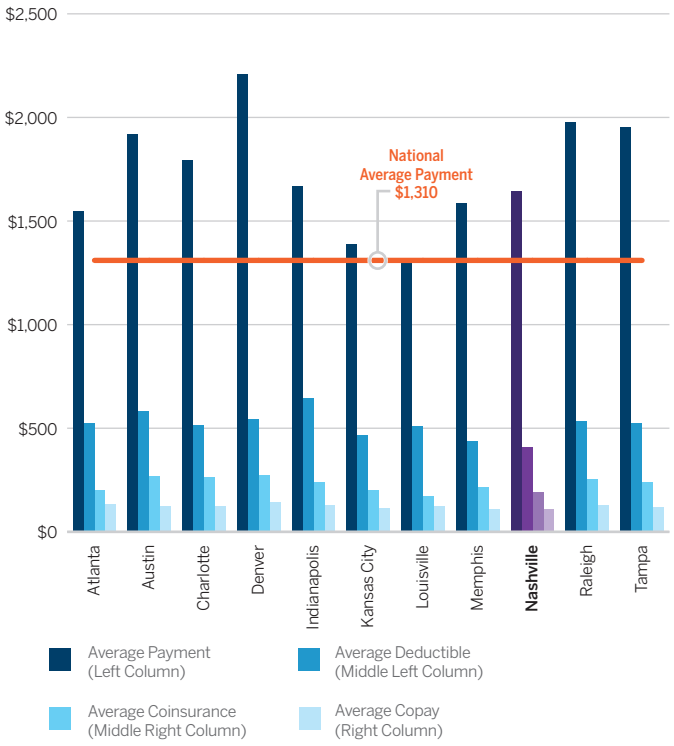
Appendix Figure 19 Commercial Claim Outpatient Payments Chart



Note: Purple color highlights Nashville MSA's average payment (dark purple), deductible, coinsurance and copay (lightest purple), respectively.
Source: Authors' calculations using Truven Outpatient Services Files 2012

Appendix Figure 20 presents the distribution of average payments within each MSA for emergency department visits. In 2012, the average cost in the Nashville MSA per emergency room visit was $1,642, among the full sample of peer MSAs; it ranged from $1,302 (Louisville) to $2,209 (Denver). Insurance companies, on average, paid $1,302 per emergency room visits in Nashville compared with a range of $955-$1,781 in peer MSAs. On average, patients with an emergency room visit in Nashville paid $406 for their deductible (the lowest of the peer group range of $406-$644), $108 for the copay (the lowest of the peer group range of $108-$142), and $189 for their coinsurance (the overall range was $170-$275).

Appendix Figure 20 Commercially Insured Average ED Cost per Visit



Note: Purple color highlights Nashville MSA's average payment (dark purple), deductible, coinsurance, and copay (lightest purple), respectively.
Source: Authors' calculations using Truven Outpatient Services Files, 2012

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The Center for Healthcare Economics and Policy ("Center"), a separate business unit in the Economics Practice of FTI Consulting, Inc., applies cutting-edge economics and quantitative methods to assist clients in developing and implementing market-based solutions across the spectrum of healthcare activity. The Center assists clients and communities in achieving goals by providing empirically based, actionable metrics and quantitative analyses, including powerful tools for assessing transformative change and for discerning value and benefits that inform choice and action.

Jen A. Maki, PhD, Senior Director, Center for Healthcare Economics and Policy, and Margaret E. Guerin-Calvert, President and Senior Managing Director, Center for Healthcare Economics and Policy, were lead authors.

http://www.fticonsulting.com/industries/healthcare/economics-policy/index.aspx

About the Nashville Area Chamber of Commerce

The Research Center

The Research Center at the Nashville Area Chamber of Commerce generates original research, analysis, information and ideas that serve regional economic and business needs. Clients from many sectors rely on the Research Center for analysis driving critical opportunities, decisions and directions. The Research Center provides analysis for the Nashville Area Chamber and business community that gives a voice and authority on key initiatives. Economic modelling, impact analysis, demographic and social research, metrics construction and business development strategies comprise the portfolio of Research Center project focus.

The Research Center delivers applied research services for public and private sector organizations using hands-on research rooted in a data-driven approach that has been nationally recognized. Research Center core values include analytical rigor; focus on unique and emerging topics; strategic design with clear goals and methods; and purposeful output aimed at transformative results. Research assessments and analyses are aligned with stakeholder insights to give decision makers succinct, actionable findings and recommendations. Studies by The Research Center have appeared in major national media and has engaged many sectors and topics including arts and culture, healthcare, education and workforce, tourism, and international business. Using empirical analysis with robust tools and experience, the Research Center engages long-standing expertise, insights and resources for major regional, community and industry development.

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