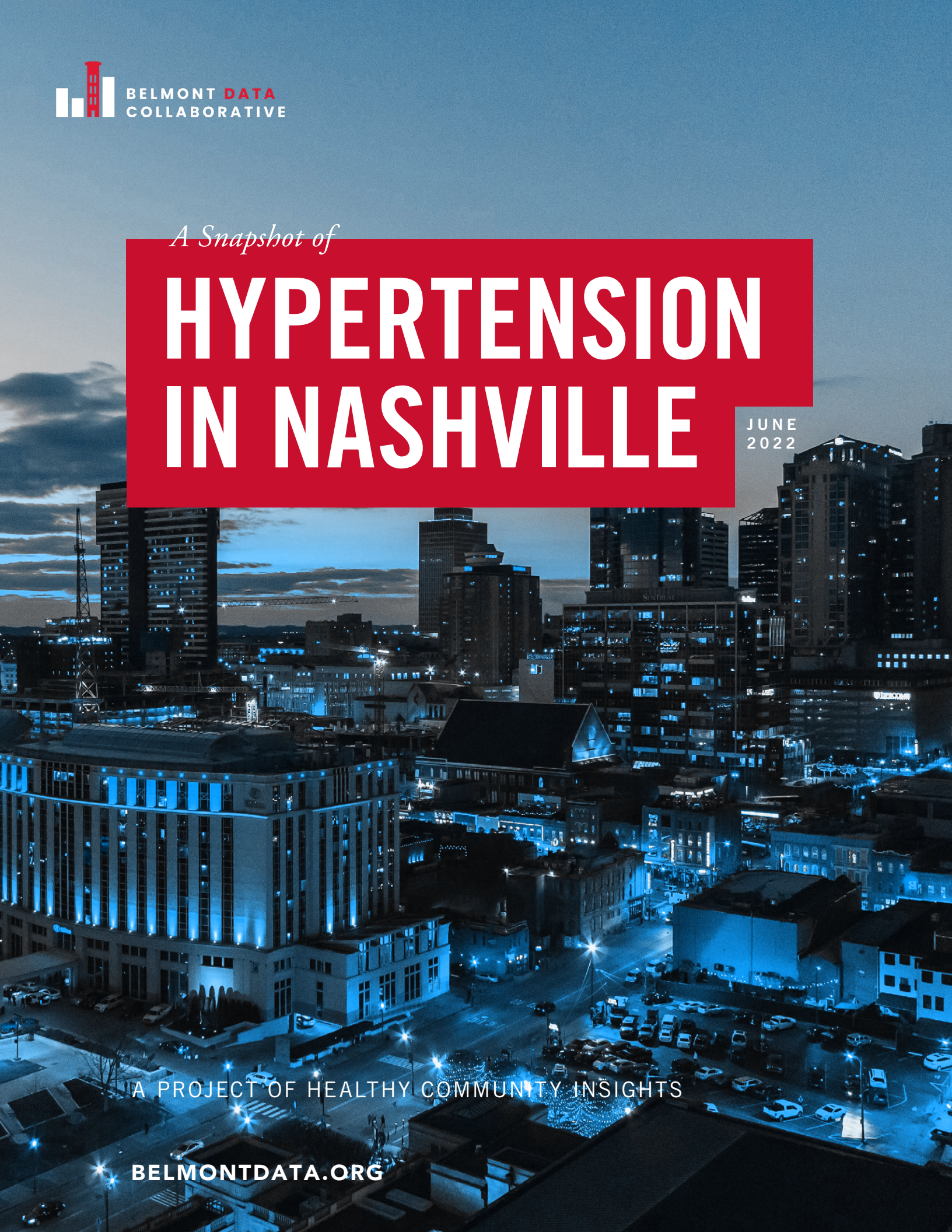
BELMONT DATA COLLABORATIVE

A Snapshot of

HYPERTENSION IN NASHVILLE

JUNE 2022



A PROJECT OF HEALTHY COMMUNITY INSIGHTS

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HYPERTENSION IN NASHVILLE

A PROJECT OF HEALTHY COMMUNITY INSIGHTS

Harnessing the power of **DATA** *to build* **HEALTHY** *communities in Tennessee.*

BELMONT DATA COLLABORATIVE | Healthy Community Insights | THRIVING CITIES GROUP

Purpose Statement

For the past 20 years stakeholders from industry, nonprofits, higher education, faith communities, and local government have been working to address issues of health and health disparities in and around Nashville. There have been individual and institutional efforts, coalitions, programs, panels, working groups, councils, and research projects aimed at solving pressing community health challenges and related inequities.

The vision of the emergent Healthy Community Insights (HCI) working group is to gather and share data in order to gain insight around pressing health concerns in order to drive effective solutions.

DIVING DEEPER

While there has been some progress, there has also been a lingering question of impact: To what extent have interventions been effective? How could they be more so? The vision of the emergent *Healthy Community Insights* (HCI) working group is to gather and share data in order to gain insight around pressing health concerns in order to drive effective solutions.

ISSUES UNCOVERED

This report addresses two related community problems. The first is the problem of hypertension—its prevalence and unequal distribution across the city. The second problem is the lack of a shared inventory of data and a collaborative platform from which to understand key insights around that unequal distribution. HCI chose hypertension as its initial focus due to the issue's persistence as a leading contributor to mortality for Nashvillians, its widespread presence throughout the city, and the existence of community wherewithal to address it at this current moment.

MOVING FORWARD

Leaders across Nashville recognize that without a common data platform, there is a risk of wasting resources and duplicating efforts in the quest to address community challenges, having little impact. This inaugural report of *Healthy Community Insights* offers a snapshot into the issue of hypertension in Nashville, and invites the community to use and share data through the Belmont Data Platform (BDP) to better address this, and other critical issues, across the city.

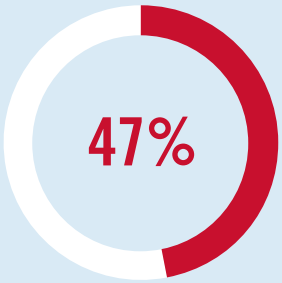
HYPERTENSION AT A GLANCE*

** Data is from 2019, unless otherwise noted.*

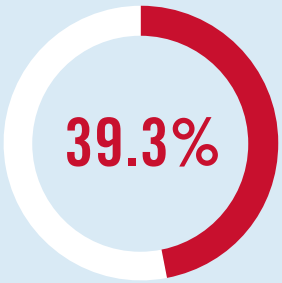
1.3 Million
Cases of Hypertension in the State of Tennessee

$15,498
Annual Cost Spent on Hypertension for White Individuals

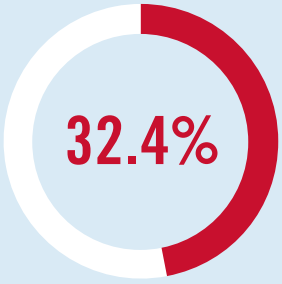
$20,398
Annual Cost Spent on Hypertension for Black Individuals



Adults in the United States Diagnosed with Hypertension



Adults in Tennessee Diagnosed with Hypertension



Adults in Nashville, TN Diagnosed with Hypertension

51
ER Visits per 1,000 Black Beneficiaries

25
ER Visits per 1,000 White Beneficiaries

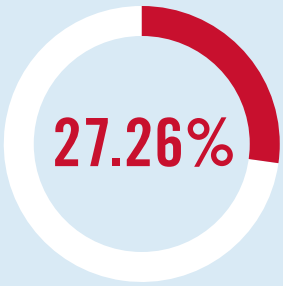
26
Hospitalizations per 1,000 Black Beneficiaries

11
Hospitalizations per 1,000 White Beneficiaries

Black Medicare Beneficiaries Spent Approximately

$4,891

More (27.26%) on Hypertension than White Medicare Beneficiaries



≈ 5 Year
Decrease in life expectancy due to hypertension if you have hypertension at age 50 for both men and women[1]

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Director's Welcome

Nashville is known as a healthcare hub and a leader in healthcare services, but the health of its citizens is poor compared to its peer cities like Austin, Charlotte, Denver, and Jacksonville. In fact, nearly one-third of all Nashvillians suffer from hypertension and many insist the root cause is due to disparities within the Nashville community's neighborhoods.

To address health disparities, in August 2021, a group convened at Belmont University that included companies (ex. ChangeHealthcare, BlueCross BlueShield, and NTT DATA), non-profits (ex. NashvilleHealth, a non-profit started by former U.S. Senator Bill Frist), American Heart Association), and government and universities, including Belmont University. This discussion focused on two initiatives for change: (1) create a centralized data platform for multi-sector health, demographic, and social determinant data at the community level, and (2) establish an action group that empowers and connects the community for data-informed social innovation and change. This action group has continued to meet on a regular basis and is formally known as Healthy Community Insights (HCI) and this report is the result of their initial hard work.

HCI is a group of like-minded individuals and organizations that look to harness data to build healthy communities. This initiative is led by the Belmont Data Collaborative at Belmont University, who along with their non-profit partner Thriving Cities Group, is taking community level data and aggregating it into one centralized platform that is open and available to the public and other stakeholders. The hope is that this will enable the community to act through a data-driven perspective, and be willing to collaborate and use data that can empower change for good. The first project is looking at hypertension health disparities within Nashville communities.

The Belmont Data Collaborative works with partners to tackle hard problems by analyzing data, providing insights, and crafting data stories to compel action. We hope you find this report a starting point for considering how we can not only be drivers of change, but also catalysts for a different way of tackling wicked problems. We see this report not as a final deliverable, but instead as the initial conversation about this way of collaborating. We will continue to look for ways to empower the city through data to help expose, prevent, and intervene in issues related to hypertension.

So, let's change the narrative on how we use data to empower individuals, organizations, and communities to bring people together to spark action. Data alone cannot solve complex problems, but it can be the catalyst for change and meaningful solutions, and with a group like Healthy Community Insights, data can be used for good.

Introduction

HYPERTENSION

CONDITIONS

CONNECTIONS

COLLABORATIONS

COMMITMENTS

According to the human ecology framework used by Thriving Cities Group to understand communities, the possibility of thriving in any city starts by securing basic CONDITIONS of material well-being for its citizens, and extends through a range of human CONNECTIONS, COLLABORATIVE projects, and civic COMMITMENTS.[2]

This snapshot report is built using a cultural framework. The assumption behind this approach is that while quantitative measures matter and are a good first step, there are key aspects of a community that aren't captured in numbers: The nature of its core values and ideas, the kinds of organizations and institutions that offer stability, its history, and people. These things, along with the data, offer a window into the ways in which efforts to solve the problem of hypertension might be supported or constrained.

This investigation also highlights the critical need for a robust model of collective impact that addresses hypertension specifically, as well as a common data platform that catalyzes and supports the effort towards better and more equitable health outcomes.

Building the infrastructure to house Nashville's privately held data was a parallel process to the analysis in the report. Project leaders felt the urgent need to provide a baseline of the issue based on publicly available indicators of hypertension's prevalence, the burden of hypertensive disease, as well as prevention and intervention. This baseline informed our imagination for the kinds of private data needed to really understand and address this issue in the community.[3] Summary measures were chosen based on community interests, a review of relevant literature, and the availability of data. The following indicators offer a picture of hypertension in Nashville: hypertension rates, emergency room (ER) visits, hospitalizations, hypertension-related mortality, uninsured population, primary care provider availability, presence of safety net clinics, fruit and veggie consumption, healthy food access, physical activity, and park access. In order to understand disparities within communities, this report includes disaggregated data as well as ZIP code-level data where available.

Per the 2021 NashvilleHealth Equity Report, geographic differences in health insurance influence geographic disparities in health outcomes.[4] While geography and race are entirely different constructs, the history of racially based residential segregation in U.S. cities highlights the importance of attending to the relationship in observing differential health outcomes. To understand the commitments, collaborations, and connections related to hypertension, we reviewed local reports, working group agendas, and websites that directly or indirectly relate to efforts addressing high blood pressure in Nashville.

ONE

CONDITIONS

Section 01

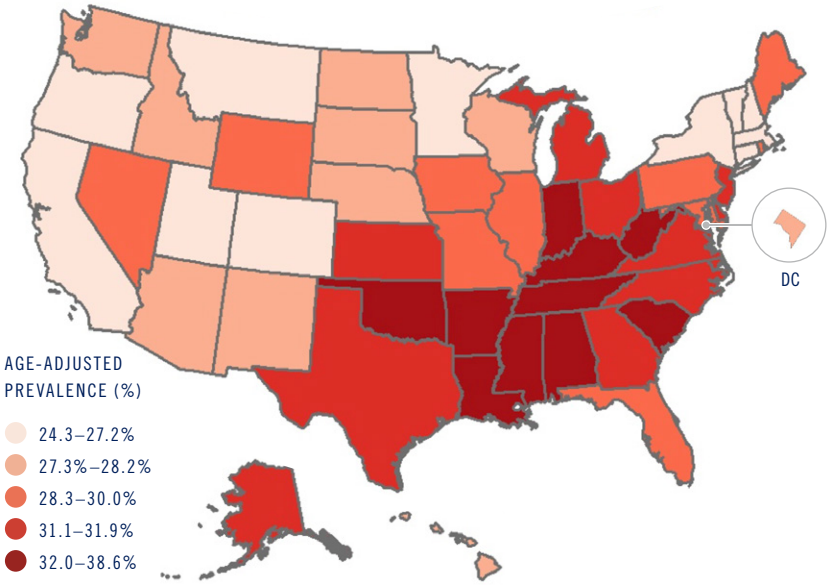
Prevalence

Hypertension affects almost half (47%) of the United States adult population and is most prevalent in the American south. There are currently 1.3 million cases of hypertension in the state of Tennessee.[5] By the year 2030, Tennessee is projected to have approximately 1.7 million cases of hypertension.[6]

Figure 01

Prevalence of Hypertension in US Adults Ages 20 & Older[7]

2017



Healthy People 2030 has two specific hypertension goals that include:

ONE

Increase control of high blood pressure in adults—HDS-05.

TWO

Reduce the proportion of adults with high blood pressure—HDS-04.[8]

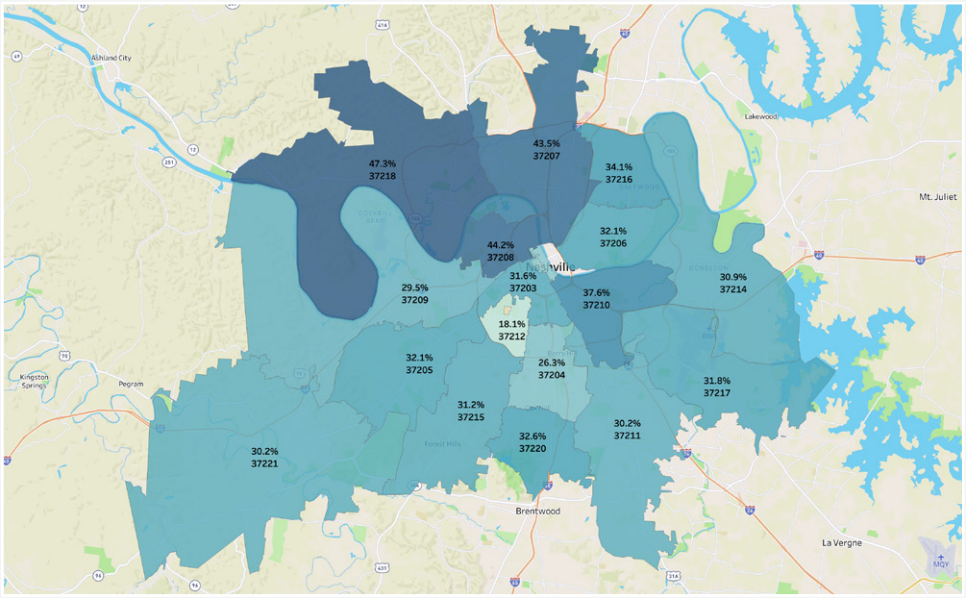
One of Million Hearts' goals over the next five years—by 2027—is to prevent one million Cardiovascular Disease Events by addressing tobacco use, physical inactivity, and health equity. In 2019, NashvilleHealth conducted a survey of adult Nashville residents and found that approximately **31%** of respondents indicated that they had been diagnosed with hypertension.[9] This is in line with 2019 estimates obtained from the Center for Disease Control and Prevention (CDC), which estimated that approximately **32.4%** of Nashville adult residents indicated that they had received a high blood pressure diagnosis.[10] While this is lower than the state rate of **39%**, there are disparities within the community.

In Nashville, hypertension rates differ based on where one lives, with rates ranging from 18.1% to 47.3% within the cities boundaries. Areas in the Northern part of the city have higher rates on average than those in the southern part of the city. Notably, residents from the **37207**, **37218**, **37208**, and **37228** ZIP codes had rates above the state average with over **40%** of their respective residents reporting having high blood pressure (**SEE FIGURE 02**).[11] These numbers likely mask the true number of those affected, considering approximately 1 in 3 people do not know they even have high blood pressure.[12]

Figure 02

Hypertension by ZIP Code[13]
2019

SEE TABLE 1, APPENDIX, P. 33.



Black residents were the most likely to report having high blood pressure.

Hispanics were more likely to have undiagnosed, unmanaged hypertension.

NashvilleHealth's 2019 report reveals that Black residents were the most likely to report having high blood pressure (about **48%**). While the Hispanic/Latino population was less likely to have reported hypertension (about **11%**),[14] researchers have found that Hispanics are more likely to have undiagnosed, unmanaged hypertension.[15]

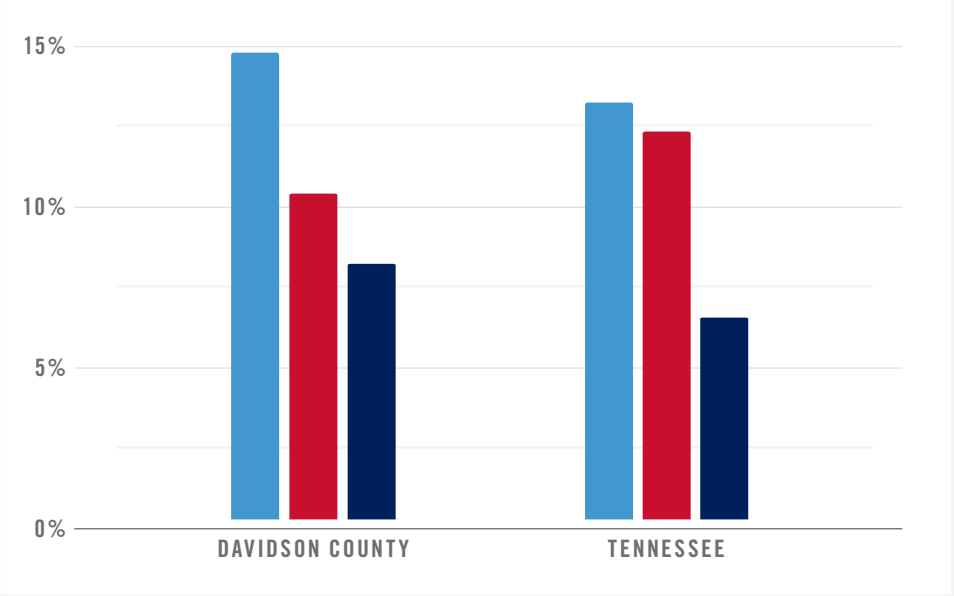


Figure 03

Gestational Hypertension in Nashville by Race/Ethnicity Compared to State

2020

In addition to race and geography, there are gender differences in hypertension rates. While men generally have higher rates of hypertension than women, pregnant women are at risk before and during pregnancy for negative outcomes related to hypertension. Gestational hypertension (high blood pressure during pre-pregnancy and pregnancy) can cause a number of challenges for both the mother and baby, including stroke or pre-term delivery.[16] Nearly **15%** of Black women in Nashville who gave birth in 2020 were diagnosed with pre-pregnancy hypertension or pregnancy induced hypertension/preeclampsia compared to **10.2%** of white women (**SEE FIGURE 03**).[17]

In 2020, Black individuals spent approximately 27.26% more on average than White individuals.

Section 02

Burden of Disease

COSTS, ER VISITS, HOSPITALIZATIONS, & MORTALITY

Hypertension-related costs, hospitalizations, and ER visits vary by subgroup across the city. Researchers have estimated that **hypertension costs Nashville $126.4 million per year** in both direct costs (e.g. medications, hospitalizations, etc.) and indirect costs (e.g. absences from work, and decreased productivity while working).[18] Among Medicare beneficiaries, the average annual cost spent on hypertension for White individuals in 2020 was **$15,498** compared to **$20,389** for Black individuals (**SEE FIGURE 04**).[19] Based on 2020 data, Davidson county had an average of 25 ER visits due to hypertension per 1,000 White Medicare beneficiaries;[20] however there were approximately 51 ER visits per 1,000 Black Medicare beneficiaries in Davidson county.[21]

ER VISITS
PER 1,000 MEDICARE BENEFICIARIES

Figure 04

Hypertension ER Visits
PER 1,000 MEDICARE BENEFICIARIES
—
2020

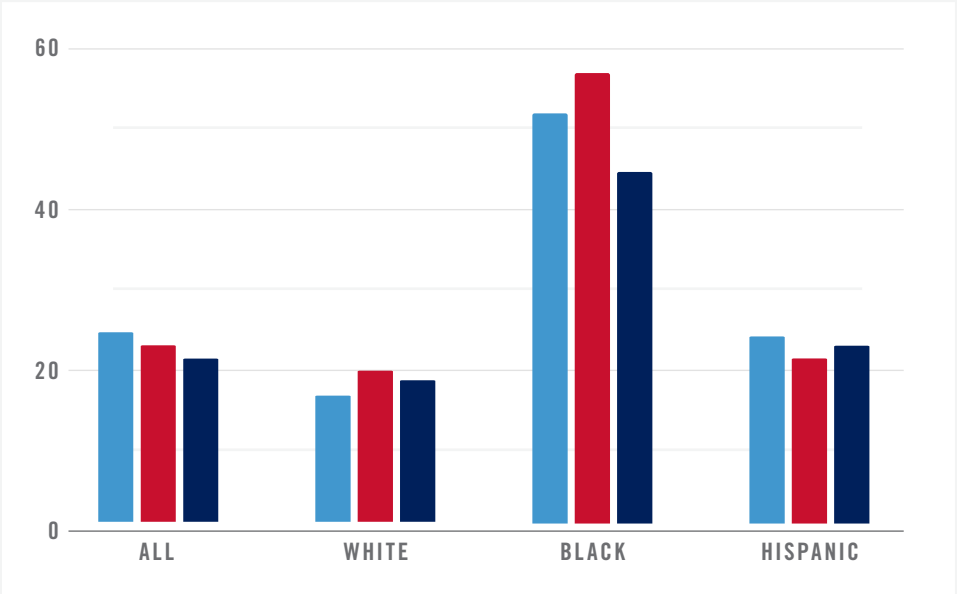
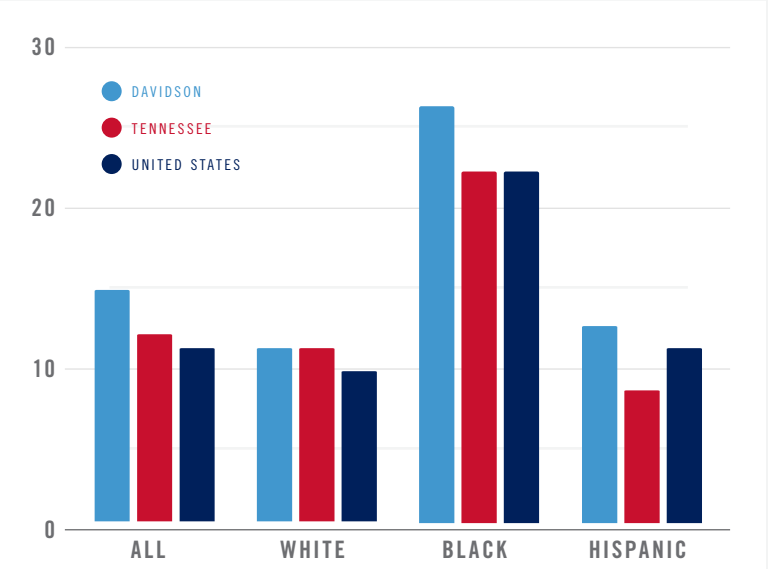


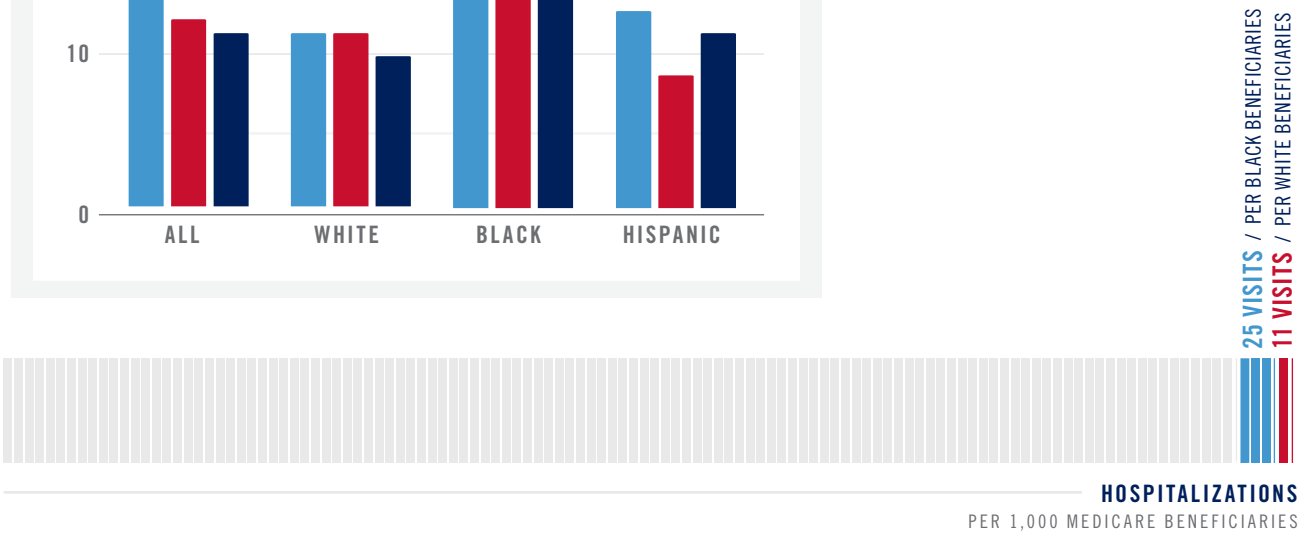
Figure 05

Hypertension Hospitalizations

PER 1,000 MEDICARE BENEFICIARIES | 2020



There is a similar trend for hospitalizations due to hypertension. In 2020, there were approximately 26 hospitalizations due to hypertension per 1,000 Black beneficiaries, compared to 11 per 1,000 White beneficiaries (**SEE FIGURE 05**).



Hypertension is often preventable and very treatable, yet the mortality rate for Nashville's Black population is significantly higher than its White population. In 2020, hypertensive disease caused **78.6 deaths** per **100,000** amongst Black residents of Nashville.[22] In comparison, it caused the death of **48.5** per **100,000** White residents in the same period. While the hypertension mortality rate has been increasing across all groups since 2014, the mortality rate amongst the Black population has increased at a higher rate.

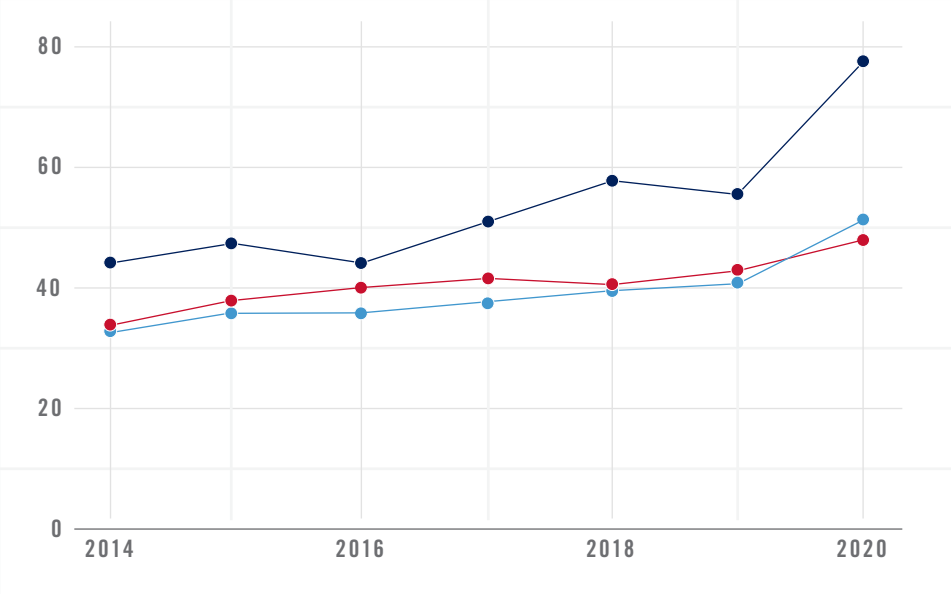


Figure 06

Mortality Rate due to Hypertensive Disease[23]

PER 100,000

NASHVILLE, 2014–2019

ALL

WHITE
Not Hispanic or Latino

BLACK
Not Hispanic or Latino

Section 03

Prevention and Intervention

Addressing the challenge of hypertension requires both preventative efforts as well as concerted progress towards interventions across the community. Access to healthcare through available primary care and insurance can provide individuals with a path to both monitor and control their blood pressure. Preventative measures do not, however, solely emerge from the healthcare system. Providing opportunities for healthier living in terms of food and exercise is the responsibility of the entire community. Here we outline some key social determinants of health across the city including healthcare, health insurance, food, and physical activity (**SEE TABLE 2, APPENDIX, P. 33**). For further exploration of social determinants such as housing cost, visit belmontdata.org.

Health Insurance

Hypertension awareness and management is more likely for individuals who are insured.[24] The southeast and northern ZIP codes in the city have the highest rates of uninsured individuals, with 37217, 37210, 37211, 37207, 27209, 37203, and 37206 having over **10%** of their populations uninsured (the state rate is 12.1%). While certain ZIP codes stand out as having high prevalence rates as well as high hypertension rates (ex 37207 and 37210), in others, the picture isn't as clear. Since having insurance is also related to awareness of hypertension, it's important to consider those ZIP codes that have the highest rates of uninsurance as places that might have more people with undiagnosed hypertension. For example, prevalence in 37211 and 37217 is only slightly above the city average, but **18–22%** of residents in those ZIP codes have no public or private health insurance, which may affect their awareness of having the disease.

Figure 07

ZIP Codes with High Blood Pressure Prevalence & Uninsured Rate

2019

ZIP CODE	PERCENT WITH HIGH BLOOD PRESSURE	PERCENT UNINSURED
37218	**47.3%**	**7.8%**
37208	**44.2%**	**9.4%**
37207	**43.5%**	**12.3%**
37228	**40.2%**	**9.7%**

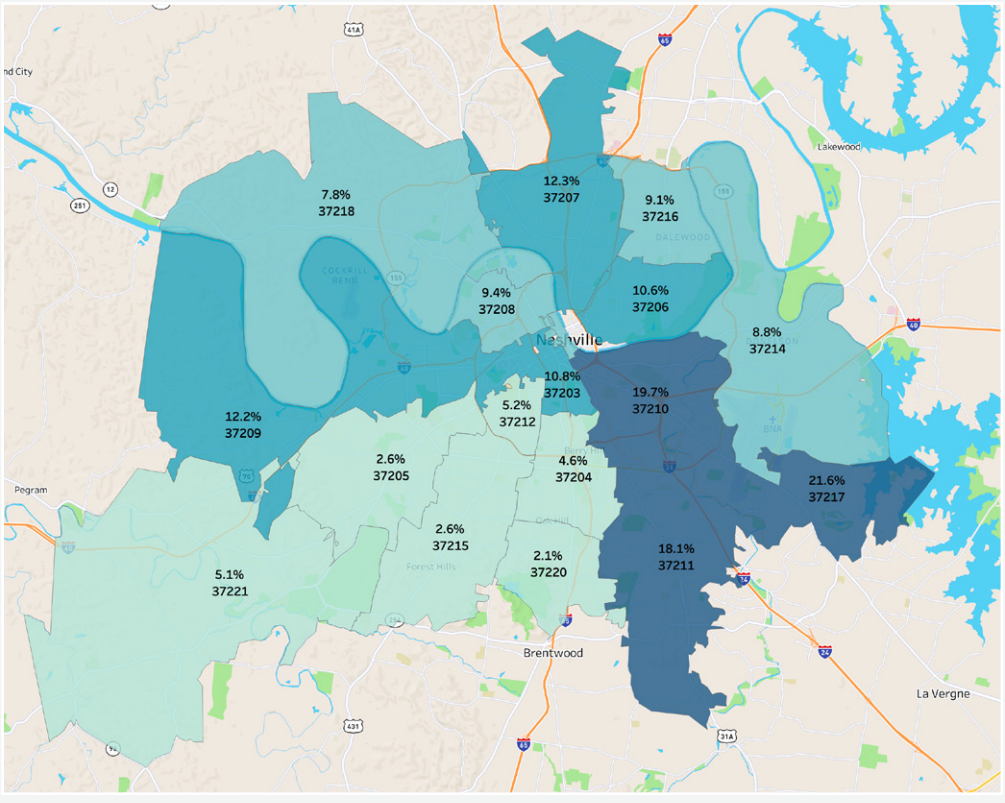


Figure 08

Percent of Uninsured Residents by ZIP Code[25]

NASHVILLE, 2020

Medically Underserved Areas are defined as geographic areas and populations with a lack of access to primary care service.

Primary Care

Primary care provides the regular opportunity for an individual to have their blood pressure checked, monitored, and treated if the need arises. While presence does not necessarily indicate utilization, it offers one measure of access. From 2014–2018, the Robert Wood Johnson's County Health Rankings shows that Davidson county had a consistently lower patient to primary care physician ratio than both the state and nation. Data from 2018 shows that on average, a physician in Davidson county had 1,041 patients, lower than the state number of 1,396.[26] However, **13.9%** of Davidson county residents live in Health Professional Shortage Areas, defined as areas that have a shortage of primary, dental or mental health care providers.[27] Certain neighborhoods (**18 census tracts**) in Nashville are Medically Underserved Areas—geographic areas and populations with a lack of access to primary care service (**SEE FIGURE 09**).

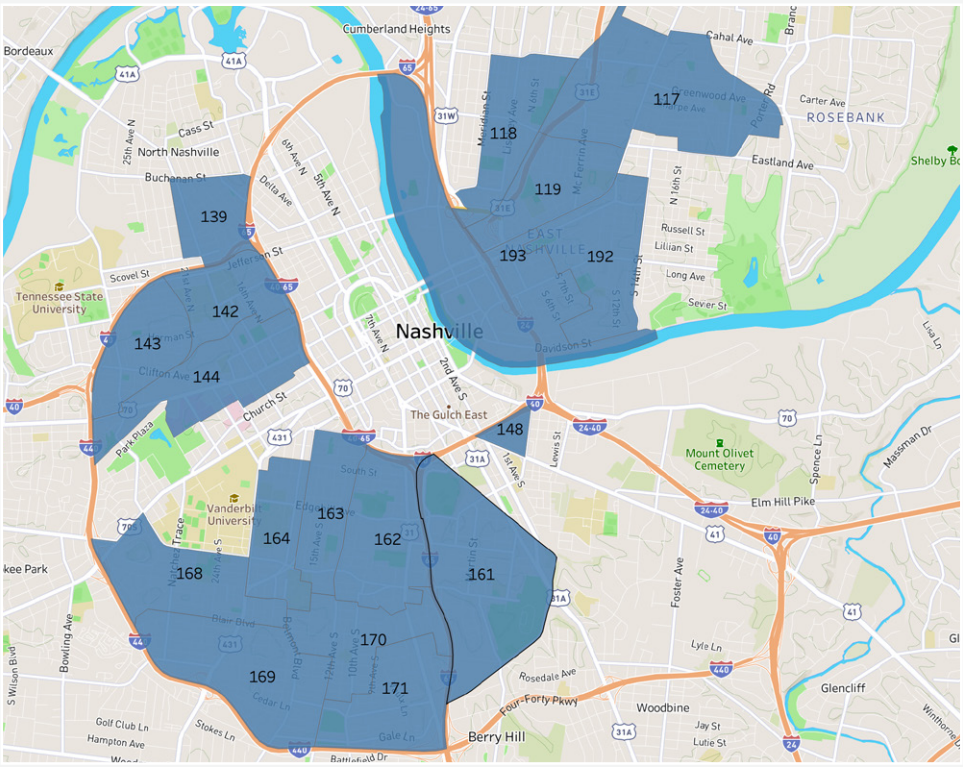


Figure 09

Medically Underserved Areas

NASHVILLE, 2020

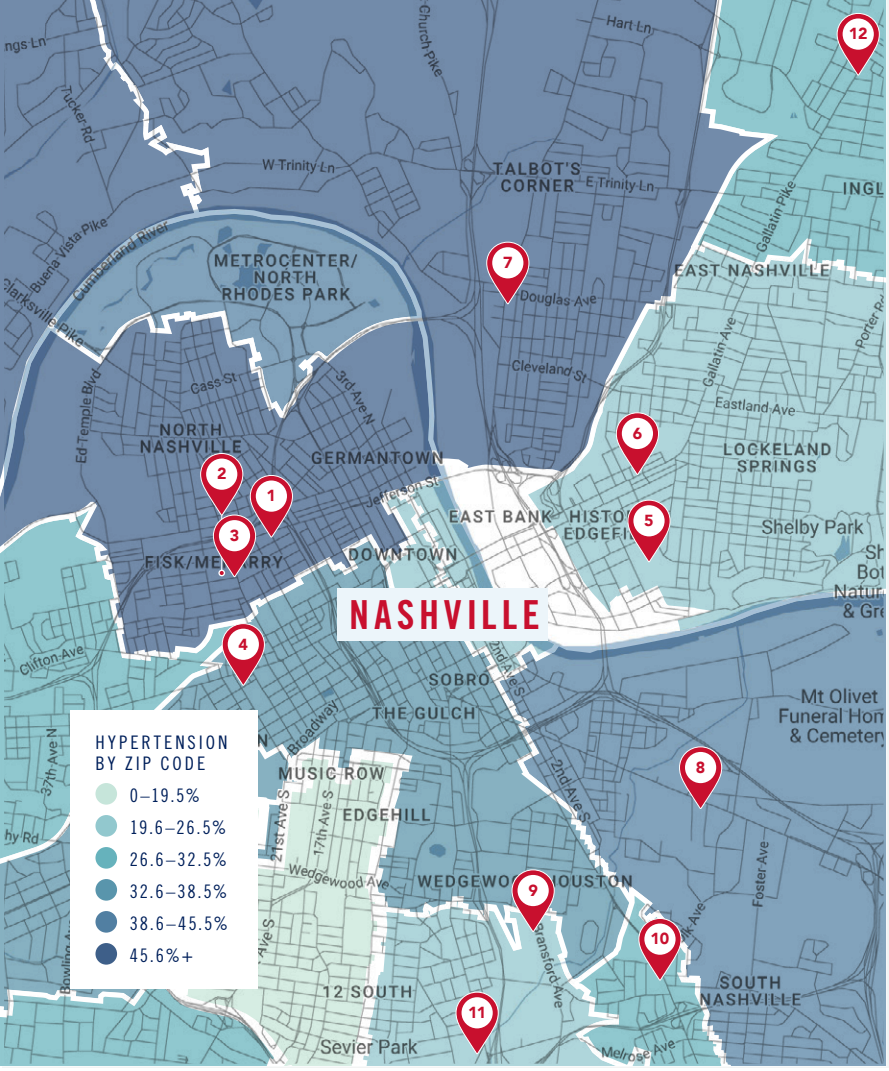


Figure 10

'My Healthcare Home' Primary Care Clinics

Clinics Within a 5-Mile Radius of the City Core

2022

1 — MATTHEW WALKER COMPREHENSIVE HEALTH CENTER

2 — FAITH FAMILY MEDICAL CENTER

3 — MEHARRY MEDICAL GROUP

4 — NASHVILLE GENERAL HOSPITAL at Meharry

5 — NEIGHBORHOOD HEALTH Cayce Place

6 — NEIGHBORHOOD HEALTH East Side

7 — NEIGHBORHOOD HEALTH Cleveland Park

8 — THE CLINIC AT MERCURY COURTS

9 — CONNECTUS HEALTH Vine Hill Clinic

10 — NEIGHBORHOOD HEALTH CASA

11 — SILOAM HEALTH Melrose

12 — NEIGHBORHOOD HEALTH Inglewood

A number of efforts have attempted to address the issue of access to healthcare. My Healthcare Home (MHH), for example, serves as an online directory of affordable healthcare providers.[28] These include primary care providers such as Federally Qualified Health Centers and neighborhood health clinics that provide care to uninsured and underinsured individuals, charging fees based on income and family size (**SEE FIGURE 10**). Access to these kinds of providers is critical for those who otherwise might be considered "medically homeless."[29]

Figure 11

Number of Adult Primary Clinics in High Blood Pressure ZIP Codes

2019

ZIP CODE	PERCENT WITH HIGH BLOOD PRESSURE	NO. OF ADULT PRIMARY CARE CLINICS
37218	**47.3%**	**0**
37208	**44.2%**	**3**
37207	**43.5%**	**2**
37228	**40.2%**	**0**

While these clinics are present in areas of need, there are ZIP codes with high hypertension prevalence where clinics are notably absent, 37218 and 37228 specifically (**SEE FIGURE 11**).

Healthy Food

There are social, genetic, and lifestyle factors, such as diet, that contribute to hypertension's prevalence in a given community. In 2019, just **57%** of Tennessee residents indicated that they consumed fruit one or more times per day.[30] According to the Metro-Nashville Food Systems Assessment (2017), **45%** of the Nashville MSA residents reported in 2015 that they ate less than one serving of fruit per day, and, citing the CDC, the assessment noted that **20%** ate less than one serving of vegetables.[31]

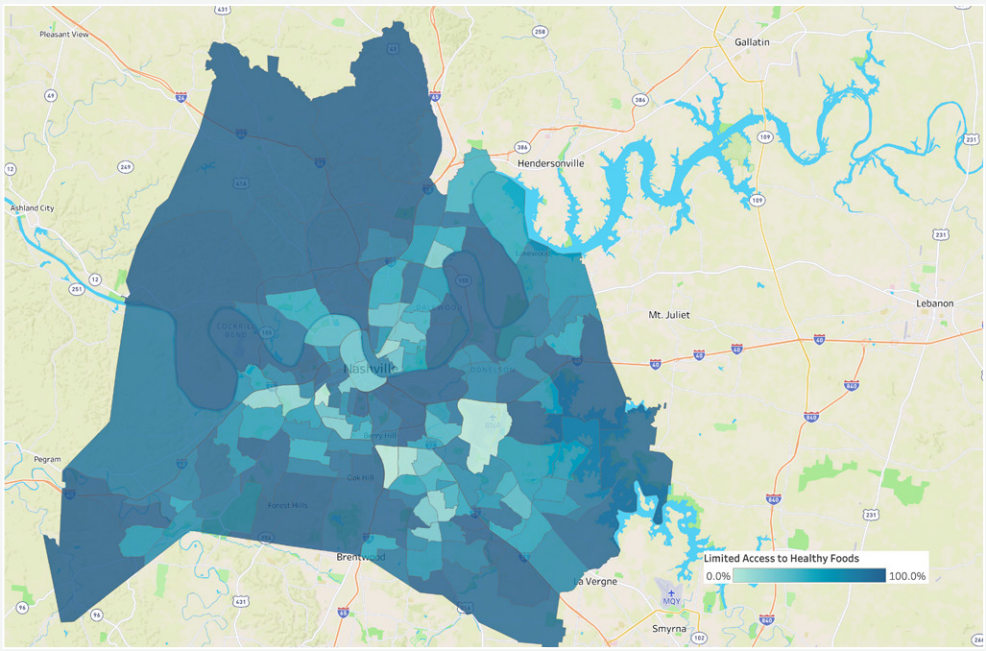
In 2010, only **27.7%** of adults in Davidson County met the Federal government's guidelines for fruit and vegetable consumption.[32]

Diet is about healthy choices, but those choices are very often constrained by supply and availability. In fact, over **70%** of residents in Nashville have limited access to healthy food,[33] and live more than a ½ mile from the nearest supermarket, supercenter, or large grocery store (**SEE FIGURE 12**).

Figure 12

Limited Access to Healthy Foods

NASHVILLE, 2019



Some of the more rural areas even report 100% of their residents having limited access to healthy foods.

Across the city, as you move out from downtown Nashville, access to healthy food becomes increasingly limited. Some of the more rural areas even report **100%** of their residents having limited access to healthy foods. This, combined with the rising number of fast food establishments, make finding healthy food a challenge across the city.[34]

According to the Healthy Food Access Portal, as of 2016 there were zero farmers markets in any of the top four hypertension ZIP codes. **By contrast, there were 62 fast food establishments across those areas. 37228 had zero full service supermarkets as of 2016.**[35]

Physical Activity

The choice-constrained-by-availability paradox is obvious as it relates to physical activity and park access as well. Overall, **28%** of Nashville residents reported being physically inactive during a 30 day survey period in 2018. In the ZIP codes with highest hypertension rates, physical inactivity rates jump to **34–36%** (**SEE FIGURES 13 & 14**). Across the city, less than half (**42%**) of residents live within a ten minute walk of green space. The Davidson County Community Needs assessment found that only **40%** of County Residents live within ½ a mile of a park.[36]

Figure 13

Hypertension & Physical Inactivity

2019

ZIP CODE	PERCENT WITH HIGH BLOOD PRESSURE	PERCENT OF PHYSICAL INACTIVITY
37218	**47.3%**	**34.4%**
37208	**44.2%**	**35.7%**
37207	**43.5%**	**35.9%**
37228	**40.2%**	**35.0%**

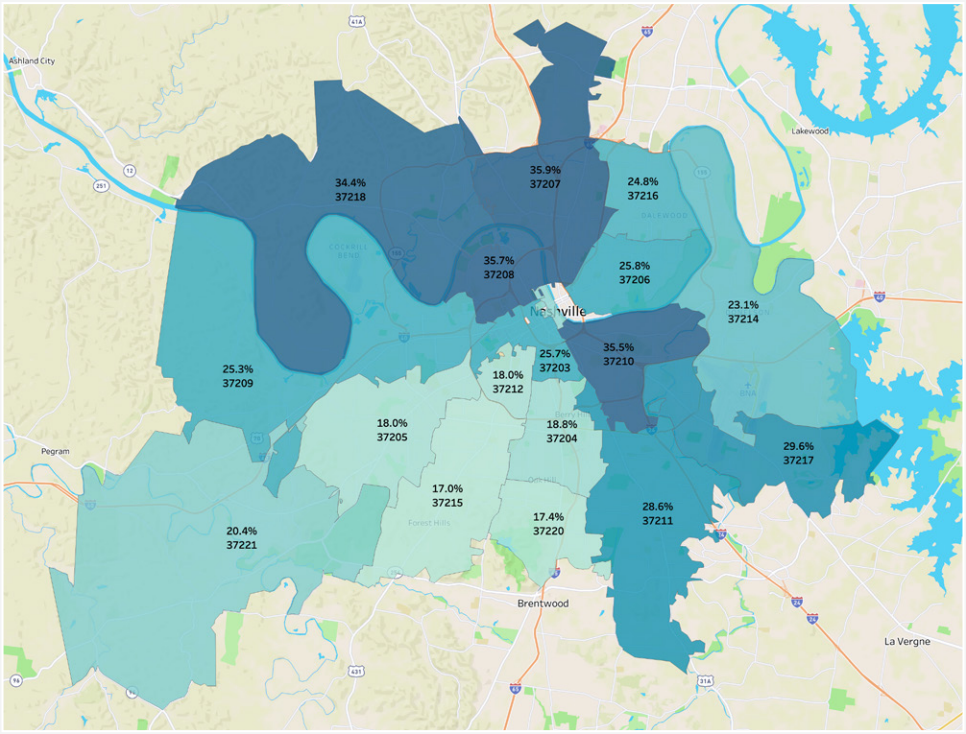


Figure 14

Physical Inactivity in Nashville

NASHVILLE, 2019

Lessons Learned

Conditions

LESSONS LEARNED & NEXT STEPS

This snapshot offers a baseline of where the community stands on a variety of hypertension-related factors. While there were some common themes across the top hypertension ZIP codes, there was also variation in the social environment.

For example, one commonality was a high rate of physical inactivity with over 34% of residents in these four ZIP codes reporting being physically inactive (compared to 28% in the city). Even though both 37218 and 37228 ZIP codes had relatively high rates of high blood pressure, both had lower uninsured populations than 37208 and 37207. Neither of the former two zip codes contains an adult primary care safety net clinic, but the latter have three and two clinics, respectively. On the other hand, 37208 and 37207 had more people uninsured and contained 3 and 2 primary care safety net clinics respectively. Despite having two primary care safety net clinics, 37207 stood out as having the highest uninsured population, the highest rates of physical inactivity, and the greatest number of fast food and take out restaurants (26) compared to the other high hypertension ZIP codes. Efforts to address hypertension across these areas and others, should consider the unique drivers that are particular to these places with high rates of hypertension, rather than universal solutions for the entire city.

TWO

COMMITMENTS

Commitments represent the core identities and values that motivate and sustain care for other people in a community. Change is more achievable when commitments are strong, overlapping, and cross-sector. There are a number of reasons why Healthy Community Insights has chosen hypertension as the first area of focus. It is in part due to multiple commitments at the national and local levels.

According to the recent *Surgeon General's Call to Action to Control Hypertension*, there is a need for national attention to the issue since it affects broad domains of health.[37] In Nashville, hypertension has been a core topic in numerous local discussions, reports, and interventions over the years. For example, the Nashville Metro Public Health Department's 2021 *Health Equity* report noted a range of health-related inequities emerging from social factors, including hypertension.[38]

"In 2020, the Healthy Nashville Leadership Council published the *Healthy Nashville Community Health Improvement Plan* (CHIP), as a result of information that emerged from the Davidson County Community Health Needs Assessment.[39] The vision that emerged from its community discovery process was, **"A healthy Nashville has a culture of compassion, where all people belong, thrive, and prosper."** The main goals of the CHIP in Nashville are in the areas of Access and Coordination of Resources, Access to Affordable Health Care, Equity, Addressing Basic Needs and Social Determinants, and Support for Mental Health and Toxic Stress. NashvilleHealth's vision complements CHIP's goals: **"Every Nashvillian can achieve a life of health and wellbeing."**[40]

THREE

CONNECTIONS

Beyond the shared commitments to address the problem at multiple levels, strong connections—the relationships and public places that bond and bridge communities—are vital to achieving a given outcome such as hypertension reduction.

Health-related institutions of all kinds certainly have a role to play in preventing and treating hypertension, and many in Nashville have taken this issue on, in terms of clinical care. Organizations that focus on healthcare for low-income, uninsured, or underinsured individuals across the city include Siloam, Matthew Walker Comprehensive Clinics, the Metro Public Health Department, Neighborhood Health, and Faith Family Medical Center, to name a few.

Nashville also has a substantial landscape of health-related higher education that helps to inform policy and programs, based on the best research: Meharry Medical college, Vanderbilt School of Medicine, the hypertension Institute at St. Thomas West Hospital, and a soon-to-be Thomas F. Frist, Jr. College of Medicine at Belmont University.

Nonprofit organizations like the American Heart Association, function alongside medical providers to bring awareness and advocacy around cardiovascular health. NashvilleHealth convenes and focuses collaborations around community health concerns. In addition, there is a wide variety of organizations and efforts that indirectly affect hypertension prevalence such as those that promote green space, local food availability, tobacco cessation. Public education systems can also be harnessed to address the issue, even if they are not currently mobilized in that direction.

FOUR

COLLABORATIONS

There is a fundamental understanding across the city that individual efforts, in isolation, are not enough to solve complex problems like hypertension and related disparities. A complex network of collaborative efforts touches on the problem in various ways—each with their own unique focus area. A number of coordinated efforts have emerged over the years, to address the disparate outcomes related to preventable diseases like hypertension by addressing the needs of the medically underserved.

In 2016, NashvilleHealth and Vanderbilt's School of Medicine came together to discern a "prescription" of efforts for Nashville to consider regarding hypertension.[41]

More recently, in 2020, Vanderbilt University Medical Center (VUMC) conducted a study of barbershop-based hypertension interventions for Black men in Nashville, working with community partners such as NashvilleHealth and My Brothers Keeper to identify and track individuals who participated in the program.

Collaborative efforts such as Project Access Nashville, the Safety Net Consortium of Middle Tennessee, and My Health Home have all emerged to address the healthcare access needs of those caught in the unfortunate gap between private and public health insurance—many of whom are at risk for developing hypertension.

Cross-sector participants in the Indigent Care Stakeholder Work Team have developed a social safety net[42] and data sharing system targeting care management for Nashville's uninsured and underinsured, called BetterHealth Nashville.[43] Recently, Vanderbilt, Tennessee State University, Meharry Medical College, and the Congregational Health and Education Network (CHEN) received an NIH grant to address health disparities related to chronic conditions like hypertension.[44]

In 2022, the Metro Parks Department and Nashville Food Project partnered to provide access to community garden space at Mill Ridge Park in Antioch.[45]

Other cross-sector groups working on Nashville's health disparities include the National Health Disparities Coalition, the Meharry Vanderbilt Alliance, the NashvilleHealth Council, the Healthy Nashville Leadership Council, and the Health Equity Working Group.

These are just some of many examples of collaborative efforts that either currently or in the future could be mobilized to address the issue of hypertension in Nashville.

Our Solution

THE NEED FOR COMMON DATA & COLLECTIVE IMPACT

The civic and cultural landscape has no shortage of commitments, institutional resources, connections, and collaborative wherewithal to address the problem of hypertension. To leverage all of this momentum towards the problem, Nashville needs a common data platform.

Nashville has needed good, relevant, accessible data with which to gain insight and develop programs for some time. Aligning commitments, leveraging connections, and ensuring collaborations are critical in addressing the complex challenges of hypertension. When all the pieces of the community are moving in the same direction, real change is possible. The quest for a place to store the community's data is not new, and the call for some kind of repository has resounded throughout the city—even as it directly relates to the problem of hypertension.

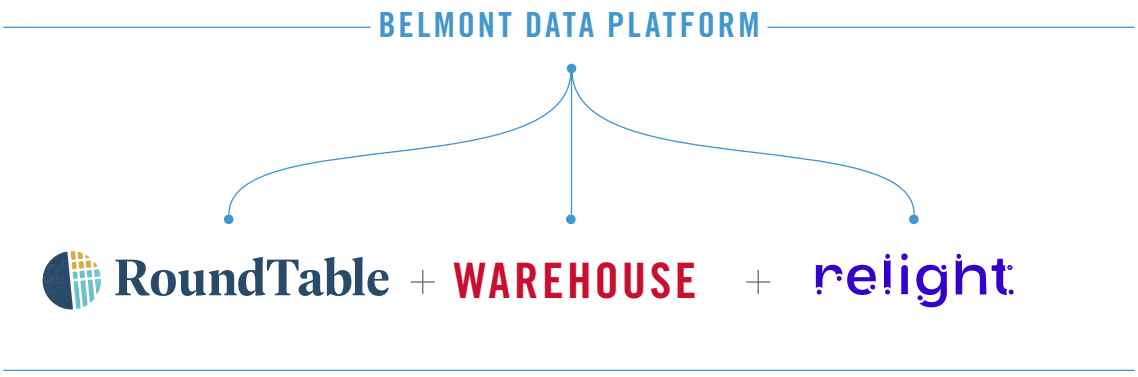
As recently as 2016, experts from multiple sectors convened by Vanderbilt University's Department of Health Policy stated that one strategy to solving the problem of hypertension was to collaboratively "collect and share data using a common data model." Panelists felt that those interested in preventing and controlling hypertension in Nashville must have the ability to share data and to operate from a similar understanding of what data mattered:

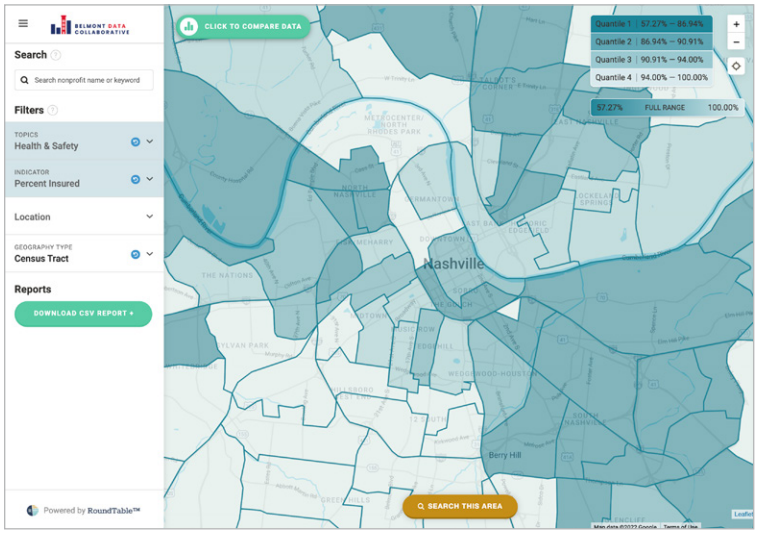
> *"The involved partners must have access to standardized data from multiple sources, including distinct health care systems and payers. This necessitates the establishment of a data repository that stores standardized data and is able to track excellence in hypertension control among health care systems or other intervention participants."*[46]

PART ONE

BELMONT DATA PLATFORM

While a number of data-collection-analysis efforts exist around the area of health and health disparities in Nashville,[47] to our knowledge none are public-facing. To address both the need for a common data system and the need for a common framework to conceptualize the data, the Belmont Data Collaborative is launching the Belmont Data Platform (BDP). Healthy Community Insights has leveraged the new BDP to make data related to this issue available to the public, and can support specific research projects by arrangement. By harnessing the community's data in the BDP and making that data free and available, critical insights emerge, giving rise to better approaches to complex challenges. The platform makes use of a product suite from Thriving Cities Group (TCG), all of which bring the community together to build a shared context and work collectively toward impact.



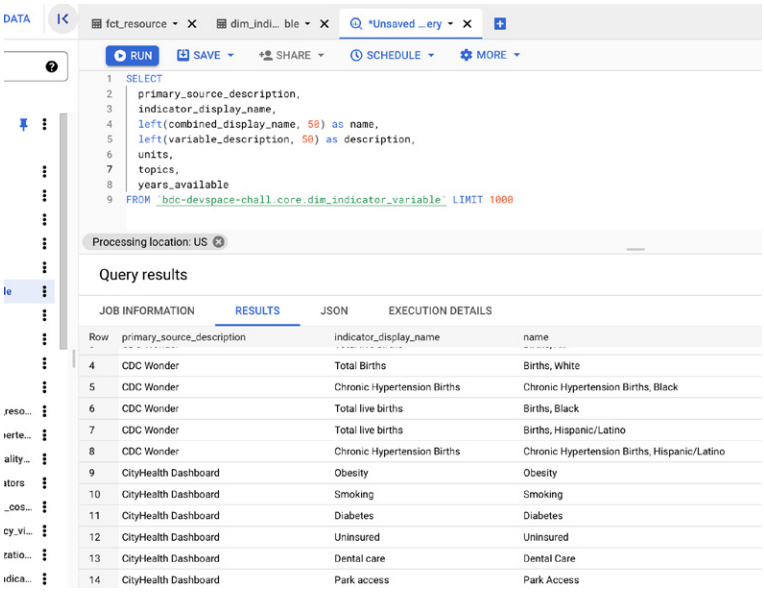


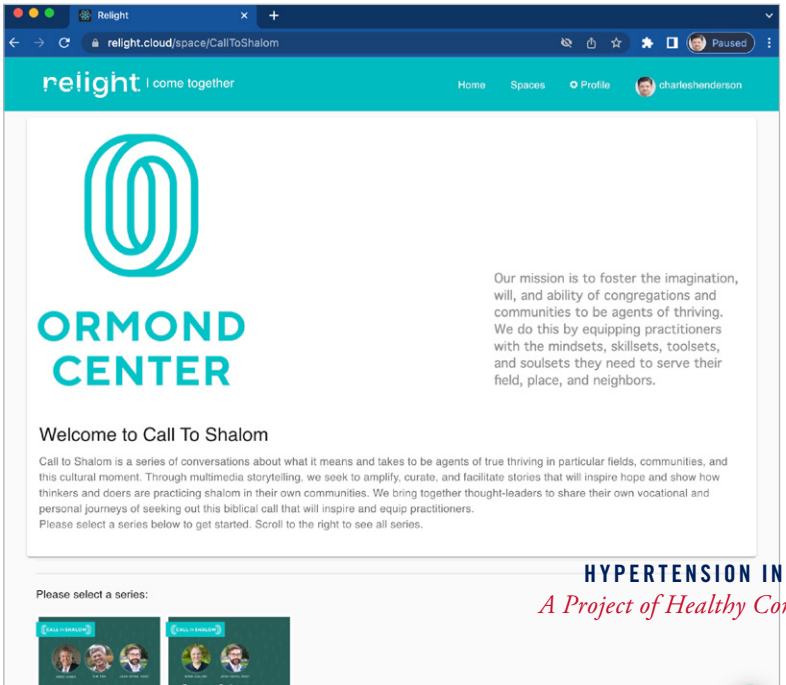
RoundTable

RoundTable is an open data mapping and visualization tool that is built to reveal community assets alongside indicators of thriving, including health outcomes and social determinants of health (SDOH). Built upon the Human Ecology Framework[48] from TCG, RoundTable combines indicator data with a catalog of community resources and organizational, program and collaboration profiles, mapping them across various geographic levels. Individuals and organizations can access RoundTable to visualize trends over time, create print-quality snapshots of a topic, and ultimately, gain insight into various challenges and the cross-sectoral resources available to address them.

Data Warehouse

The Data Warehouse is a secure repository of curated public and private data that offers a growing inventory of research-level data for the Nashville Metropolitan Area and the state of Tennessee. Belmont is also partnering with companies such as ChangeHealthcare and Blue Cross Blue Shield TN to enhance its data for healthy communities. While its initial data is being gathered as part of this initiative, the warehouse is intended to serve as a single, consistently organized facility to host data for work in many different subject areas. The warehouse operates from a modern cloud-based infrastructure which can be used to host more sophisticated work beyond raw data set hosting.





Relight

Relight is a facility in which the community working to mitigate the effects of hypertension and other such issues can come together to interact online. Relight enables the ecosystem of problem-solvers to come together, learn together, and solve together by allowing data-informed dialog and a shared repository of ideas and insights. It has been used to host conversations both technical and philosophical, with participants from all over the world.

PART TWO

A MODEL OF COLLECTIVE IMPACT

Standard models of collective impact describe an intentionally structured way of coordinating efforts and working together to solve a particular problem. The fundamental idea behind this approach is that groups sharing information and working in the same direction are more likely to instigate positive social change. The essential components of collective impact include: a common agenda, shared measurement systems, mutually reinforcing activities, and continuous communication. Sharing data and deploying resources towards particular issues illuminated by indicators will make positive collective impact more likely. The Belmont Data Collaborative has positioned the Belmont Data Platform as the shared measurement system for collective impact in Nashville. Yet a technical solution is not enough. Systemic change and transformation will require a broader frame of reference and involvement from a wider set of institutions and relationships.

The BDC built the data platform using the Human Ecology Framework to understand what matters in solving a given problem. Rather than describing a way of working together, the Human Ecology Framework examines six fundamental areas of community wealth and well-being across places, which can be deployed towards a given challenge. If the community desires to initiate a model of collective impact around hypertension, considering how the issue relates to each of these areas of health and wellbeing is an important first step:

Human Knowledge and Learning

Economic Life

Social Mores and Ethics

Political and Civic Life

Creativity, Aesthetics, and Design

Natural and Physical Health

Applying this perspective in Nashville towards the issue of hypertension requires envisioning what kinds of assets and organizations are needed to reduce hypertension and hypertension-related inequities across the city. Below we outline examples of questions to consider related in each area of human ecology, as well as institutions and places that could be leveraged in the quest to reduce hypertension. Addressing Nashville's hypertension problem in a way that is transformative, will require **mobilization in every sector of the city's social and cultural landscape.**

Human Knowledge

KEY QUESTIONS

- What kinds of research on the issue of hypertension is needed? How should it be shared?
- What new innovations are required? How are they funded?
- How do schools educate and bring awareness about hypertension and at what levels?
- To what extent should we work to preserve cultural practices and history that may contribute to the problem?
- How are those practices framed, taught, and shared?
- What knowledge about hypertension resides in the community that isn't obvious in our data and surveys?

INSTITUTIONS & PLACES TO BE LEVERAGED

Universities • Libraries • Public Schools • Public Squares • Media • Public Art • Job Training Centers • Book Stores • Community Gardens

Social Mores & Ethics

KEY QUESTIONS

- How does parenting play a role in food and activity choice? What role might early childhood development have in addressing hypertension over time?
- Is hypertension a lifestyle choice, or socially determined, or both, or neither? How might that belief impact our ability to solve the problem?
- What stories are needed for more resources to be distributed?
- What volunteers are needed for which critical organizations?

INSTITUTIONS & PLACES TO BE LEVERAGED

Families • Religious Organizations • After-School Programs • Charities • Schools • Community Centers • Sports • Social Services • Farmer's Markets

Creativity, Aesthetics, & Urban Design

KEY QUESTIONS

- How does the design of Nashville's environment play a role in hypertension?
- How might art, festivals, and entertainment lower stress levels, thus lower hypertension?
- What kinds of creative placemaking could incorporate hypertension reduction efforts?

INSTITUTIONS & PLACES TO BE LEVERAGED

Community Planning Boards • Public Art/Galleries • Restaurants • Public Spaces/Promenades/ Gardens • Commemorative Sites • Innovation Districts • Real Estate Developers

Economic Life

KEY QUESTIONS

- What workplace policies are or should be in place to address hypertension?
- What investments are needed? What kinds of land development should occur and where in the city?
- Are there certain incentives or regulations that could address hypertension determinants?
- Could more philanthropic entities fund hypertension specific efforts?
- What is the landscape of food production and consumption in the city? How much of whose money would reducing sodium intake save? How much money would be lost in food sales, and by whom?

INSTITUTIONS & PLACES TO BE LEVERAGED

Industries • Businesses • Real Estate • Innovation Districts • Job Training Centers • Transit Oriented Development • Vendors/Farmers' Markets • Corporations

Political & Civic Life

KEY QUESTIONS

- What kinds of political deliberations and debates are required to address hypertension?
- What are the possibilities and limits of Medicaid expansion?
- How would this change hypertension rates?
- How can we reduce violent crime in particular places, and would this lead to lower hypertension?
- What is the relationship between inclusionary zoning for affordable housing and hypertension?

INSTITUTIONS & PLACES TO BE LEVERAGED

Local Government • Neighborhood Associations • Public Spaces for Democratic Processes • City Hall • Community Centers • Civic Groups • Public Transportation • Affordable Housing

Natural & Physical Health

KEY QUESTIONS

- How does our management of energy, land, and air quality impact our blood pressure rates?
- What common clinical practices should we adopt at what levels?
- What environmental regulations can we promote around emissions, waste, and sanitation in order to address hypertension and related disparities?

INSTITUTIONS & PLACES TO BE LEVERAGED

The Public Health Department • Public Parks/Forests • Green Infrastructure • Hospitals/Clinics • Bike Lanes • Sidewalks • Restaurants • Local Food Sources • Environmental Organizations

PART THREE

FINAL THOUGHTS

Future research should consider all relevant place-based possible drivers and outcomes and apply creative analytic strategies to generate critical place-based insights. By strengthening community Connections and prioritizing collaborative efforts Nashville is well-positioned to address hypertension and to do so in such a way as to address inequities and ensure greater thriving among the city's residents.

Conclusion

NEXT STEPS

Actionable next steps fall into three categories: EXPOSURE, INTERVENTION, and PREVENTION. Complex community issues must first be exposed as a problem through data and a narrative that gets to the root of the issue.

Once the problem has been established, individuals, organizations, and government look to interventions to help individuals that currently need assistance. Finally, data-informed solutions look to find the root cause of the issue and help to prevent or mitigate in the future. For hypertension disparities within Nashville, we address all three categories for actionable solutions.

ONE

EXPOSURE

We recognize the many efforts by others to expose and address the health challenges facing Nashville. We are excited to join with them and together, we hope, strengthen our collective capacity for making real and lasting change through this contribution to the conversation and with what follows. The Belmont Data Collaborative will provide all relevant data from its **Data Warehouse** at **belmontdata.org** and a mapping visualization tool called RoundTable that provides relevant indicators and resources for hypertension at different geographic levels (ie. ZIP code, U.S. census tract). Through **RoundTable**, everyone will have the ability to be empowered with community level data from Nashville and the state of Tennessee.

TWO

INTERVENTION

Once we have identified opportunities for change and improvement through exposing the issues within health disparities, the need to facilitate discussion and collaboration with healthcare professionals, data experts, local and state government, and non-profits that provides actionable services and solutions for hypertension is next. Fortunately, organizations like NashvilleHealth and Center for Non-Profit Management are already bringing people together to look at neighborhood health and economic disparities. Also, because of this report and the continued work by so many, Healthy Community Insights is planning a summit slated for the Fall 2022 to continue the discussion and bring individuals together.

THREE

PREVENTION

At Belmont, teams of students have already started working on analyzing the data through several summer programs, including the RISE program which gives high school students the ability to work on the data during a 6 week summer program. The Belmont Data Collaborative is also employing a team to dive deep into the data to identify specific features that precede high blood pressure and also the ramifications of hypertension. Finally, with its partner Thriving Cities Group, they are launching a platform, **Relight**, that will allow for online collaboration so that individuals (internal and external to Belmont University) can work on these issues and share their findings.

With the creation of the Belmont Data Platform, which includes the **Data Warehouse**, **RoundTable**, and **Relight**, along with this report and the future opportunities for collaboration, we hope this is a viable mechanism to expose the problems within the community, identify and collaborate with others for interventions, and finally analyze the data and dive deep into the root causes of the problem so that we can prevent future disparities and make Nashville a healthy community.

TEAM & KEY PARTNERS

Belmont University

Located near the heart of thriving Nashville, Tennessee, Belmont University consists of nearly 8,800 students who come from every state and 33 countries. The University is nationally recognized for its innovative approach as well as its commitment to undergraduate teaching (U.S. News & World Report). As a Christ-centered, student-focused community, Belmont's mission is to develop diverse leaders of purpose, character and wisdom who possess a transformational mindset and are eager and equipped to make the world a better place. With more than 115 areas of undergraduate study, 41 master's programs and five doctoral degrees, Belmont University aims to be the leading Christ-centered university in the world, producing leaders who will radically champion the pursuit of life abundant for all people. For more information, visit www.belmont.edu.

Belmont Data Collaborative

The Belmont Data Collaborative (BDC) is an initiative at Belmont University that looks to infuse data skills into every facet of the culture and curriculum as well as within the community. Founded in August 2021 when President L. Greg Jones tasked an interdisciplinary team of faculty, deans, and external data professionals to develop a plan to educate students for success in an increasingly data-driven world, and strongly position Belmont to partner with a variety of for- and non-profit organizations in the wider Nashville and Middle Tennessee community, addressing the pressing need for data-driven solutions to organizational and societal challenges.

With a united effort from colleges and departments, Belmont moved swiftly to start this initiative with the hiring of its first Executive Director, Dr. Charles H. Apigian. Dr. Apigian has been in the tech and data community in the Middle Tennessee region for the past 20 years with ties to the tech industry and non-profit community through his development of a data science institute and data science curriculum at Middle Tennessee State University. Dr. Apigian was also very active in bridging the gap between industry and academia in the tech and data domains, including several accolades includes Nashville Post IT in Charge List from 2018 to 2022, Nashville Technology Council Community Leader of the Year (2018) and the Data Scientist of the Year (2020).

Belmont Data Collaborative

Continued

Since its inception, the Belmont Data Collaborative has focused on data skills for all and to champion complex problems within the community. This includes data-driven community projects, projects within the community (ex. food bank, human trafficking, affordable housing, and health disparities within Nashville), data hackathons, the Belmont Data Platform that is highlighted in this report, and the development of the Data Story Creative Process (a process approach to creating a data story).

Through the BDC, Belmont University will create data storytellers that can use data to provide meaningful insights and actionable stories. Not only will Belmont produce students that are data ready through classroom experiences, but through the BDC, students and faculty will have real-world projects for social innovation and the well-being of the community. None are more pertinent to this initiative than the hypertension and health disparities projects with Healthy Community Insights. The creation of Healthy Community Insights is the culmination of collaboration, championing data-driven projects, community involvement, and data storytelling for the students and faculty at Belmont University and for the good of the community.

NashvilleHealth

In 2015, former U.S. Senate Majority Leader Bill Frist, M.D. established a robust and collaborative health movement, NashvilleHealth. Senator Frist recognized that his hometown—despite its reputation as a health services capital—ranked far behind peer cities in community health with the worst life expectancy and highest rates of infant mortality, smoking, and number of poor mental health days. Since its origin, NashvilleHealth has sought to improve the health and well-being of every single Nashvillian in a collective, collaborative, and coordinated way by identifying our city's health challenges, advancing partnerships for action, and catalyzing initiatives for measurable outcomes.

Key to this vision is the need for accurate, accessible, and, most importantly, actionable data to identify the obstacles to health that many in our community face. In 2019, NashvilleHealth conducted a citywide Community Health and Well-being Survey to identify and document our city's health challenges, unveiling harsh health equity disparities particularly among our most vulnerable. Seeking to build on this work and understanding the necessity of good data for impact, NashvilleHealth and Senator Frist reached out to Belmont University to propose a comprehensive, trusted, integrated, and sustainable data center that will positively impact the wellness of every single member of our community. This report serves as the first product of this data collaborative, setting the stage for sustainable and impactful community-wide initiatives that will propel our city toward a more equitable and healthier future.

Healthy Community Insights

Harnessing the Power of Data to Build Healthy Communities

Healthy Community Insights is a group of like-minded individuals and organizations that look to harness data to build healthy communities. The idea of this group was inspired by the work started by physician and former U.S. Senate Majority Leader Bill Frist, M.D. who recognizes that Nashville—despite its reputation as a health services capital—ranks far behind peer cities in community health with a significant contributor being the disparities within its communities. Through this passion and desire to make change, Sen. Frist established a robust, collaborative health movement: NashvilleHealth, which has been a supporter of this group.

This desire to change the narrative of healthy communities, former Senator Bill Frist reached out to Belmont University and President L. Greg Jones to continue to seek collaborative movements to address the problem—with the main objective being that data must be open and available to all to make change. Through the Belmont Data Collaborative, Belmont took the lead on the creation of this group and in August 2021, Belmont convened a group that included companies, non-profits, and government and universities. This discussion focused on two initiatives for change: (1) create a centralized data platform of community-level data for multi-sector health, demographic, and social determinant data, and (2) establish an action group that empowers and connects the community for data-informed social innovation and change. This action group has continued to meet on a regular basis and is formally known as Healthy Community Insights (HCI) and this report is the result of their initial hard work.

HEALTHY COMMUNITY INSIGHTS PARTNERS

American Heart Association

Belmont Data Collaborative

Belmont University

BlueCross BlueShield of TN

Center for Medical Interoperability

Change Healthcare

Hospital Corporation of America

Huron Consulting Group

Intelluron Corp.

Memphis Business Group on Health

NashvilleHealth

NTT DATA, Inc

Office of Senator Bill Frist, M.D.

Thriving Cities Group

TN Department of Human Services

True North Geographic Technologies

University of Tennessee-Health Science Center

Appendix

Table 1

Percentage of Population with Hypertension

BASED ON GEOGRAPHY

GEOGRAPHY LEVEL	LOCATION	PERCENT WITH HIGH BLOOD PRESSURE
State	Nashville	32.4%
County	Davidson County	32.7%
ZIP	37212	18.1%
	37219	24.3%
	37201	24.5%
	37204	26.3%
	37228	40.2%
	37207	43.5%
	37208	44.2%
	37218	47.3%

Table 2

Overlap of Hypertension Rates, Physical Inactivity, Primary Care Clinics, & Fast Food Restaurants

ZIP CODE	PERCENT WITH HIGH BLOOD PRESSURE	PERCENT OF PHYSICAL INACTIVITY	NO. OF ADULT PRIMARY CARE CLINICS	NO. OF FAST FOOD & TAKEOUT RESTAURANTS
37212	18.1%	18.0%	0	13
37219	24.3%	19.8%	0	21
37201	24.5%	19.5%	0	8
37204	26.3%	18.8%	2	29
37209	29.5%	25.3%	0	37
37211	30.2%	28.6%	4	70
37221	30.2%	20.4%	0	25
37214	30.9%	23.1%	0	47
37215	31.2%	17.0%	0	19
37203	31.6%	25.7%	1	57
37217	31.8%	29.6%	1	26
37205	32.1%	18.0%	0	16
37206	32.1%	25.8%	2	13
37220	32.6%	17.4%	0	1
37216	34.1%	24.8%	1	19
37210	37.6%	35.5%	1	14
37228	40.2%	35.0%	0	6
37207	43.5%	35.9%	2	26
37208	44.2%	35.7%	3	20
37218	47.3%	34.4%	0	10

Endnotes

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48 In addition to describing the role of he 4C's of the Civic Substructure, the Human Ecology Framework provides a way of viewing a community as an ecological system made up not just of systems, but of culture. In this perspective, communities are made up of six overlapping areas of wealth and wellbeing that contribute to dimensions of thriving.

THRIVING
CITIES GROUP

The Thriving Cities paradigm emerged out of an initiative of the Institute for Advanced Studies in Culture at the University of Virginia. It builds upon a "human ecology" framework, which sees cities as complex, asymmetric, and dynamic social systems that both empower and constrain the ways of life, and life chances of their residents. The Thriving Cities Group uses a multi-disciplinary approach that brings together decades of research, training, community organizing and technology.

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For more information about the Thriving Cities Group, please visit ThrivingCitiesGroup.com