Creating a Hypertension Control and Prevention "Prescription" for Nashville

Report from Hypertension Expert Panel Meeting
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Executive Summary

Rationale:
Vanderbilt University's Department of Health Policy convened an expert panel to advise NashvilleHealth on hypertension treatment and control interventions in four domains: policy, media, community settings, and healthcare. The goal of this panel was to create a "prescription" specifically for Nashville that took into consideration 1) lessons learned in other communities, 2) existing programs and policies in Nashville, 3) the political landscape of Nashville and Tennessee, and 4) scientifically-supported evidence on best practices and programs.

Expert Panel: Six (6) national experts in research and implementation of hypertension control policies and programs were identified using literature searches and expert interviews.

- Panelists were chosen to achieve balance along several dimensions, including domain of expertise, gender, and geographic location.
- The panel was conducted using a modified Delphi technique, in which panel members were asked to provide input before, during, and after the meeting.
- Pre-meeting work included feedback on literature searches and pre-ranking of intervention options in each of the four identified domains.
- During the panel meeting, experts were asked to discuss their pre-meeting rankings and then re-rank options within each domain by coming to consensus.
- Then, panel members were asked to rank these options across domains, given hypothetical time and resource constraints.
- Using the constraints, the panel prioritized 5 short-term and 5 long-term strategies from the 13 strategies that were highly ranked across the domains.

Recommendations: The final sets of recommendations for implementation are below.

Short term (First year):

- **Foster "learning collaborative" of hypertension care providers**: The panel supported the concept of NashvilleHealth creating a "learning collaborative" in which medical providers and public health leaders come together to create shared goals and methods for reaching these goals. This could follow the model used by Be There San Diego (http://betheresandiego.org).

- **Encourage attention to blood pressure control in value-based payment models:** Panelists recommended leveraging public/private partnerships with employers, ACOs (e.g. MissionPoint), insurers, and Medicaid MCOs to identify opportunities for blood pressure control incentive programs, demonstrations, and quality improvement initiatives.

- **Establish trust with community stakeholders:** In order to build trust in a community, NashvilleHealth should consider the community's perceived health needs. Hypertension disproportionately affects historically underserved and vulnerable communities, which also have higher levels of mistrust toward the research and medical community: it was acknowledged that community efforts should meet people where they are. The panel recommended that NashvilleHealth engage Meharry Medical College because of its credibility in African-American communities.

- **Expand worksite programs and support hypertension coverage policies:** The panel considered these types of programs to be "low-hanging fruit" and should be prioritized highly because employers have financial incentive to improve the rates of blood pressure control among its employees. Additionally, panelists suggested creating an incentive or recognition program for employers who implement worksite wellness programs to incentivize blood pressure control.

- **Opportunistically establish linkages between community programs and health care providers** : Referrals between community settings and health care systems should occur frequently. Community-based screening and education should be connected back to a health care provider, and health care providers should be offering services in community-settings (i.e., outside of the traditional medical office model). These linkages should take advantage of existing safety net organizations, including faith-based clinics and FQHCs, who could adopt similar protocols for screening, diagnosing and treating hypertension.

Long term (1-5 years):

- **Provide hypertension training and certification for mid-level providers; promote team-based care** While specialization is not needed for 75-80% of hypertension cases, individuals with drug-resistant hypertension or complex comorbidities would benefit from specialized care provided by mid-level providers (e.g. nurse practitioners) with additional hypertension training or expertise. This training could follow the model used by University of Chicago Medicine Comprehensive Hypertension Center (http://www.uchospitals. edu/specialties/endocrinology/hypertension.html#P23_1524).

- **Collect and share data using a common data model**
  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.

- **Eliminate financial barriers to appropriate medication therapy**
  Nashville has several free or reduced cost pharmacy options, including Publix grocery stores and the Dispensary of Hope. Ways to secure and expand low-cost options should be explored and a directory of these resources could be disseminated to physicians and community members.

- **Provide access to blood pressure monitors**
  Though individuals with hypertension could be trained to monitor and report their blood pressure, self-measured blood pressure monitors are expensive and often not covered by insurance. NashvilleHealth could explore options to distribute blood pressure monitors to those at high risk for a cardiovascular event.

- **Push for healthy food orientation**
  Restaurants, large employers that have food options onsite, culinary institutes, and schools could be encouraged to reduce salt in food.

Introduction

Across the United States, communities are considering collective impact initiatives to address health challenges and improve the health of their citizens. Using published evidence from other communities, national efforts, and previous local efforts, collective impact organizations have created and implemented programs to address health challenges.

Vanderbilt University's Department of Health Policy convened a hypertension prevention and control expert panel to advise it's partner local nonprofit, NashvilleHealth, on interventions in four domains: policy, media, community settings, and healthcare. The goal of this panel was to create a "prescription" specifically for Nashville that took into consideration 1) lessons learned in other communities, 2) existing programs and policies in Nashville, 3) the political landscape of Nashville and Tennessee, and 4) scientifically-supported evidence on best practices and programs.

Hypertension Screening and Control
Despite a hypertension rate of 28.4% (BRFSS, 2013) and the high incidence of comorbidities associated with uncontrolled hypertension, Nashville lacks targeted hypertension programs. Because of this, NashvilleHealth has chosen hypertension as one of its first priorities. Further, there is a collective interest among health care providers and community organizations to participate in coordinated efforts to address hypertension.

Pre-Meeting

Identification of Experts
Six (6) national experts were chosen to provide a balanced perspective and expertise in one of four intervention domains (policy, healthcare, community settings, and media).

- David Harrison, MD- Panel Chair; Betty and Jack Bailey Professor of Medicine and Pharmacology, Vanderbilt University School of Medicine
- Joshua Beckman, MD MPH – Panel Co-chair; Professor, Department of Medicine, Vanderbilt University School of Medicine
- Katherine "Kitty" Bailey, MSW – Executive Director, Be There San Diego
- Bill Paul, MD MPH – Director, Metro Nashville Public Health Department
- Eduardo Sanchez, MD – Chief Medical Office for Prevention, American Heart Association
- Kevin Thomas, MD – Associate Professor, Department of Medicine, Duke University School of Medicine
- Ronald Victor, MD – Director, Center for Hypertension, Cedars-Sinai Medical Center
- Janet Wright, MD – Executive Director, Million Hearts

Detailed biographies of each of these panel members and the domains they were assigned to can be found in the **Appendix A**.

Literature Review
Prior to the panel meeting, the national tobacco control experts were asked to provide feedback on literature searches conducted by staff at Vanderbilt. Search terms and criteria for the literature review can be found in **Appendix B**. Each panel member was assigned to at least one domain and asked to respond to four questions for each domain to which they were assigned.

1. What literature, either gray or published, is missing?
2. Should we be aware of any ongoing, unpublished work?

3. Which of these articles is most definitive?
4. Which 4-5 articles should be most heavily emphasized in a one-page summary of the literature?

Using panel member feedback on the literature in each domain, Vanderbilt staff compiled one-page literature summaries for each domain. These summaries can be found in **Appendix C**.

Environmental Scan and Pre-Rankings
Since July 2015, NashvilleHealth has been conducting informal interviews with local stakeholders to identify existing programs and resources in Nashville and Tennessee related to hypertension control. Using this information and other resources, NashvilleHealth created a comprehensive environmental scan of Nashville's hypertension prevention and control interventions in each of the four domains (policy, healthcare, media, and community). Using the NashvilleHealth environmental scan and evidence from the literature reviews, Vanderbilt staff developed several potential interventions in each domain and requested that expert panel members pre-rank these interventions.

In-Person Meeting

On May 18, 2016, members of Vanderbilt's Department of Health Policy, NashvilleHealth, and the expert panel met in Nashville, TN to devise a set of short and long-term recommendations for hypertension prevention and control in Nashville. The meeting was led by an expert panel chair and a panel facilitator. The role of the panel chair was to clarify points of confusion, facilitate meaningful discussion, answer panel members' questions, and keep panel members on task. The facilitator's role was to make real-time updates to the electronic version of the pre-meeting recommendations, facilitate re-ranking, and answer panel members' questions.

Meeting Details
The meeting began with NashvilleHealth providing a brief overview of its mission and strategic goals. Vanderbilt's Department of Health Policy provided background information on Nashville, including demographic information, information regarding rates of poverty, insurance status, and educational attainment, and the prevalence of hypertension. See **Appendix D** for this information.

Introductions and background information were followed by discussion of the pre-ranked options by domain (healthcare, community, media, and policy). For each domain, the four most highly pre-ranked options were discussed and subsequently re-ranked by consensus among the expert panel. Intervention options not included in the four most highly pre-ranked options were discussed if expert panel members suggested their relevance.

The results of the within-domain ranking process can be found in **Appendix E**. While some of the pre-meeting options were selected in the within-domain consensus process, majority of the final options for implementation were devised by consolidating the pre-meeting options or creating new options. This process was guided by discussion among the expert panel members.

After within-domain rankings were complete, the panel ranked options across domains. Panel members were given time (12 months) and budgetary constraints ($1 million) and were asked to rank the recommendations based on what was most feasible and had the highest impact, given the political, economic, and programmatic landscape of Nashville and Tennessee. Ten options were ranked highly across domains: five (5) were recommended for initial implementation, and five (5) were recommended for long-term implementation. The results of the across-domain ranking are below.

Recommended Strategies

SHORT TERM STRATEGIES

Convene providers: Aim to foster a "learning collaborative"

The panel supported the concept of NashvilleHealth creating a "learning collaborative" in which medical providers and public health leaders convene to outline shared goals and methods to achieve these goals . For example, Be There San Diego has created a "University of Best Practices", which meets once a month to discuss data and have a "lunch and learn" with an external presenter. The three individuals necessary to convene the "University" are a convener, a trusted champion, and a health services researcher.

To ensure quality care, there was agreement that developing a standardized algorithm for diagnosis and treatment of hypertension might be the first goal of the learning collaborative. In November 2013, the American Heart Association (AHA)/American College of Cardiology/Centers for Disease Control and Prevention (CDC) released a scientific advisory promoting the use of an algorithm to help control high blood pressure in clinical settings. Be There San Diego created a one page standardized algorithm for their providers, and Million Hearts has several algorithm examples posted to its website that could be used for guidance.

Encourage attention to blood pressure control in value-based payment models and employer wellness programs.

Panelists recommended leveraging public/private partnerships with employers, ACOs (e.g. Mission Point), insurers, Medicare/Medicaid, among others to find opportunities for blood pressure control incentive programs, demonstrations, and quality improvement initiatives. If these entities had existing hypertension programs, it was suggested that NashvilleHealth find ways to complement or extend this work. Additionally, it was suggested we recognize employers who take steps through worksite wellness programs to get their employees' blood pressure under control.

Establish trust with community stakeholders

The general consensus among panelists was that establishing trust within communities disproportionately affected by the hypertension should be a pivotal first step. Within these communities, research institutions have often conducted research in ways that erode trust between community members and researchers. During a trust-building phase, the generalized mistrust of the research community, needs to be recognized, directly addressed, and discussed.

Panelists suggested that the trust building phase should be community centered: engaging community members in conversations about trust and specific community health needs. These conversations would provide essential information about community context that may limit the success of proposed interventions. For example, NashvilleHealth should recognize launching a neighborhood-based walking campaign may be hindered by the number of stray dogs in a particular area. NashvilleHealth must be willing to address the "stray dogs" first, in order to build relationships and trust within certain communities. Trust can also be built through involvement of community members who have established relationships with other community members. Panelists recommended that NashvilleHealth engage Meharry Medical College because of its credibility in African-American communities.

Expand worksite programs and support hypertension coverage policies.

There was general agreement that worksite interventions are potentially highly successful, short term wins that should be a top priority. Unlike other community sites (e.g., barber shops and fire stations), employers have a financial incentive to improve the health of their employees, which influences health insurance premiums and worker productivity. It was brought to the attention of the panel that a workplace wellness initiative was created

as a part of the county's Communities Putting Prevention to Work (CPPW) grant. This initiative could serve as a precedent for a high blood pressure-focused worksite program.

Panelists also recommended using a hypertension-focused intervention as an opportunity to discuss employers smoke-free workplace policies and food policies, creating a multi-pronged approach. Though worksite interventions were prioritized, NashvilleHealth should not lose sight of reaching individuals in community settings.

Opportunistically establish linkages between community programs and health care providers.
Panelists repeatedly stressed the need for clinical-community linkages. These linkages should be bi-directional. Community-based screening and education should be connected back to a healthcare provider, and healthcare providers should be aware of services in community-settings (i.e., outside of the traditional medical office model). These clinical-community linkages should include existing primary-care safety net providers, including faith-based clinics and Federally Qualified Health Centers (FQHCs), who often have relationships with communities and other community-based organizations because of their location in the community and their board composition. These providers, along with other primary-care providers in academic or "private practice" settings, could adopt similar protocols for screening, diagnosing and treating hypertension.

In addition, panelists provided suggestions for trusted settings where clinical/community linkages could be implemented, including:

- Libraries – Arkansas has implemented hypertension screening in libraries
- YMCAs or other recreation/fitness centers – A modified version of the Check it Change it has been piloted in several states and is likely to be implemented in Nashville in the near future.
- Barbershops/beauty salons
- Fire stations – Should be done on an infrequent basis, like quarterly or once a year, and well publicized
- Churches
- Pharmacies

LONG TERM STRATEGIES (1-5 YEARS)

Provide hypertension training and certification for mid-level providers; promote team-based care
Panelists agreed that hypertension should be provided via a team-based care model that incorporates additional staff to work with a primary care provider, including nurses, dietitians, pharmacists, and social workers. Mid-level practitioners, such as nurse practitioners and physician assistants, may also be engaged in these teams as primary care providers. Roles in team-based care include medication management, behavior change, patient follow-up, and medication adherence.

The importance of formal certification for management of high blood pressure was also discussed by panel members. The American Society of Hypertension (ASH) provides a mid-level professional hypertension certification exam at a cost of $400, which allows providers to be considered specialists. Most hypertension teams do not need specialist-level certification to manage 75-80% of high blood pressure in the primary care setting. However, individuals with resistant hypertension or complex comorbidities might benefit from consultation with a specialist. Given that hypertension certification may be cost prohibitive and needed for only a select population, panelists noted that it might be useful to consider having one certified provider in a care team.

Collect and share data using a common data model
It is necessary to establish a respository of data to show progress toward common goals. The absence of standardized measurements presents challenges to the completion of this task by limiting understanding of the impact of the initiatives, and preventing iterative changes necessary for steady progression towards set goals. Standardized data collection across multiple providers has the benefit of enabling them to compare, benchmark,

and potentially apply for grants jointly. It also provides an opportunity to recognize excellence among participants.

Eliminate financial barriers to appropriate medication therapy
Several panelists encouraged the creation and distribution of a directory of low-cost drug and treatment sources, including the Dispensary of Hope and Publix's free medication program. Steps should be taken to expand low-cost options where possible, such as at pharmacies and grocers. This means the physicians should be familiar with no or low-cost medication formularies for Publix or Wal-Mart, for example.

Enhance access to validated,high quallty blood pressure monitors
Panelists recognized the importance of training individuals to self-monitor and submit data to their physicians. It was recognized that healthcare providers teach and expect persons with diabetes to self monitor and that similiarly, persons with hypertension could also be trained and expected to monitor their own blood pressure.

For example, the "Check It, Change It" program in Durham, NC distributed blood pressure monitors with USB connectivity to their patients (funded by Novartis). Distribution of these units should be prioritized - given to individuals at highest risk for a cardiovascular event. A clinical committee could be tasked with determining distribution and developing a program to ensure the use of these units is linked to a health care provider. Another initiative by Blue Cross Blue Shield (BCBS)- Federal Employee Program's Coronary Artery Disease Management Program- provides no-cost electronic blood pressure monitors to federal employees diagnosed with hypertension. Panelists suggested contacting BCBS about expanding this program in Tennessee – perhaps to state employees who are insured under BCBS. The panel did not reach consensus on whether 24-hour monitoring should be supported.

Push for healthy food orientation
Panelists agreed that a sodium labeling policy (i.e., New York City) is not politically feasible and has been ineffective in changing consumer behavior or improving hypertension control. Instead, a better strategy might directly engage restaurants, large employers that provide employee meals, culinary institutes, and schools, to encourage them to reduce sodium in meal preparation. Tennessee schools have already taken steps to reduce sodium to comply with the 2010 federal Healthy, Hunger-Free Kids Act. Additionally, in 2016 the Food and Drug Administration (FDA) has issued draft guidance to the processed food and restaurant industries, calling for reduced sodium in foods.

LOWER PRIORITY STRATEGIES ACROSS-DOMAIN RANKINGS

The following four options were highly ranked within each domain, but were not highly ranked across domains either as a short-term (within 1 year) or long-term (1-5 years) intervention.

Use focus groups to understand effective messages, messengers, and channels for Nashville regarding hypertension
A number of panelists recommended conducting focus groups with community members to understand the best messages and messengers, as well as the appropriate avenues to relay this information. The importance of telling a persuasive story, such as having more birthdays, not being hospitalized, or living long enough to see your grandchildren grow up were emphasized.

Draw on existing (low-cost) free materials from other campaigns (e.g. AHA and Million Hearts)
There was broad support for using pre-existing media materials from groups such as the AHA and Million Hearts. Panelists recommended partnering with local media affiliates to get free air time or print space to run existing campaigns and suggested identifying novel venues for advertising.

Panelists recognized the media campaign should be instructive: thus, a campaign should not be launched until there was adequate capacity to 1) handle potential traffic online/by phone and 2) provide quality clinical care. Panelists noted that it may take up to two years to establish the necessary foundation and relationships to support a large media campaign.

Find local champions and celebrities to drive "eyes" to the campaign
Because Nashville is home to a number of musicians and celebrities, panelists were supportive of engaging these individuals to participate in the media campaign. Celebrities could star in a 10-15 second clip that introduces other existing materials.

METRICS AND MEASUREMENT

Panelists were asked for feedback on potential metrics and on how success should be measured. Four suggestions were made: 1)success should be measured differently in each domain; 2) community metrics should consist of process measures (e.g. number of community meetings convened) and health outcomes; 3) clinical metrics should on par with Million Hearts goals, broken down by demographic group and include, for example, prevalence, number enrolled in treatment, and control (as adherence is harder to track); and 4) clinical measures should also include rates of strokes and heart attacks.

The panel also suggested potential data and data sources that may be useful. These included, Davidson's Behavioral Risk Factor Surveillance System (BRFSS), emergency department visit and mortality data on cardiovascular and stroke deaths, census data with prevalence data overlaid, the Institute for Health Metrics and Evaluation at the University of Washington and the Metro Public Health Department. The group emphasized the importance of getting data reported by subgroup – age, race, income, gender, coverage – if possible; ideally by 9-digit zip code. Panelists suggested the utility of a local sample potentailly funded through the local government or local hospitals. For example, Dallas, TX uses NHANES methodology (measurement, not self-report) and cost approximately $8 million.

Post-Meeting

After the in-person meeting concluded, NashvilleHealth and Vanderbilt worked together to collate notes taken during the in-person meeting. Vanderbilt staff compiled an initial report that was sent to panel members to ensure fidelity of the information included in this report. The next phase of this process presents the findings to NashvilleHealth's hypertension working group to gather local feedback on the panel's recommendations. Based on local feedback about the feasibility of the proposed interventions for Nashville, the expert panel members may be asked to re-evaluate their recommended strategies.

Appendix A. Detailed Biographies and Domains of Panel Members

Ms. Katherine "Kitty" Bailey (Media, Healthcare) is the first Executive Director of the San Diego Be There Initiative. Kitty has extensive leadership experience in building coalitions such as Be There to address important health care issues. Kitty received a BA degree from College of the Holy Cross and a Master of Social Work with an emphasis in public policy and non-profit administration from the University of Denver. She served as Chief Operating Officer and Deputy Director of the Colorado Community Health Network where she led development of a strategic plan, secured funding of some $20M annually and managed relationships with key partners such as the Colorado Department of Health Care Policy and Financing and the Colorado Health Council. Upon relocating to San Diego, she assumed the position of Executive Director of the San Diego Medical Society Foundation where she implemented the re-launch of Project Access San Diego and developed and oversaw public relations activities and fostered relationship with other health care partners. Most recently, she has held the position of Vice President of Strategic Initiatives for North County Health Services. In that capacity, she was responsible for business development, tracking legislative and regulatory developments, and grant submissions, and successfully obtained $6.5M in new funding for the Carlsbad Family Medicine Clinic, Oceanside Pediatric clinic, and Women's Health Services Clinic in San Marcos.

Dr. Joshua Beckman (Panel Co-chair, Healthcare) is a Professor of Medicine at Vanderbilt University School of Medicine and Director of the Section of Vascular Medicine at Vanderbilt University Medical Center. After earning his medical degree from New York University School of Medicine in New York City, he completed an internship, residency, and chief residency in internal medicine at Columbia Presbyterian Medical Center and postgraduate fellowships in cardiovascular medicine and vascular medicine at Brigham and Women's Hospital.

Dr. Beckman's research focuses on the mechanisms that cause vascular dysfunction and susceptibility to atherosclerosis, translating discoveries made at the lab bench to human beings. Dr. Beckman has an ongoing interest in understanding how diabetes impairs vascular function, investigating the salient mediators of hyperglycemia and insulin resistance. Ongoing investigations seek to understand how insulin resistance impairs endothelial cell signaling and vasomotor function, whether atherosclerosis causes insulin resistance and vascular dysfunction, and the impact of thrombin receptor inhibition on endothelial and vascular smooth muscle function.

Dr. Beckman is the current Chair of the Peripheral Vascular Disease Council of the American Heart Association, member of the Peripheral Vascular Disease Section of the American College of Cardiology, and previous President of the Society for Vascular Medicine. He was won teaching awards, including the Eugene Braunwald Award at Brigham and Women's Hospital and the W. Procter Harvey Young Teacher Award of the American College of Cardiology.

Dr. David Harrison (Panel Chair, Healthcare) is the Betty and Jack Bailey Professor of Medicine and Pharmacology and the Director of Clinical Pharmacology at Vanderbilt University School of Medicine. He received his MD degree from the University of Oklahoma in 1974 and obtained his house staff and clinical cardiology training at Duke University. From 1980 to 1982, he completed a cardiovascular research fellowship at the University of Iowa. In 1982, he joined the faculty at the University of Iowa, and was promoted to the rank of Associate Professor in 1987. In 1990, he moved to the Cardiology Division at Emory University, where he was appointed Professor of Medicine. In the 1980s and 1990s, Dr. Harrison has served as the Director of Cardiology at both the Iowa City and Atlanta VA hospitals and was the Director of Cardiology at Emory from 2000 to 2009. In 2011, he was named the Director of Clinical Pharmacology at Vanderbilt University.

Dr. Harrison has been an Established Investigator of the American Heart Association and has served on numerous committees for the AHA, including the AHA Scientific Sessions Planning Committee, the AHA Research Committee, the Novartis Award committee and the Credentialing committee for the Council on Circulation,

which he chaired. He also served as the Chairman of the AHA Council on Circulation. In 1992, he was elected to the American Society of Clinical Investigation and in 2002 to the Association of American Physicians.

Dr. Harrison has served as the Chairman of the National Institutes of Health Experimental Cardiovascular Studies Study Section (ECS). Dr Harrison has served on the editorial boards of multiple journals, including *Circulation, Circulation Research, Atherosclerosis Thrombosis and Vascular Biology, the Journal of Clinical Investigation and Hypertension*. In 2002, Dr. Harrison received the Robert M. Berne Award from the Cardiovascular Section of the American Physiological Society. In 2004, Dr. Harrison received the Novartis Award from the American Heart Association Council on High Blood Pressure, which is the highest award given for hypertension research. In 2010, he received the Carl Wiggers Award for Cardiovascular Physiology from the American Physiological Society. In 2010, he was also named a Distinguished Scientist of the American Heart Association.

His career has been devoted to basic research related to vascular function and hypertension. He work has been seminal in understanding how vascular cells produce reactive oxygen species (ROS) and the consequences of these in diseases such as hypertension and atherosclerosis. He and his colleagues have defined roles of the NADPH oxidases in hypertension, and have shown that these enzymes produce radicals that promote inflammation, vasoconstriction and hypertension. His work has also shown that reactive oxygen species produced by the NADPH oxidases lead to activation of other sources of ROS, leading to a feed-forward amplification of oxidant injury. His recent research has focused on the role of inflammation and immunity in hypertension. His research team has shown that T cells derived cytokines affect renal sodium and volume handling and that this is crucial for development of hypertension. He and his colleagues have discovered a novel role of isoketal-adducted proteins acting as neoantigens in hypertension. Dr. Harrison has also been actively involved in Medical and Scientific Education throughout his career. He has had over 50 post-doctoral fellows train in his laboratory, and many of these have developed their own successful research careers.

Dr. Bill Paul (Policy, Community) is the Director of the Metro Nashville Public Health Department in Nashville, TN. Dr. Paul has served as the director for two mayoral administrations. Since taking his post in July 2007, Dr. Paul has been responsible for overseeing the public health and well being of Nashville's citizenry. In 2009, he led one of the country's Communities Putting Prevention to Work grants in Nashville. Dr. Paul currently serves on the Board of Directors of the National Association of County and City Health Officials (NACCHO) and the executive board of Alignment Nashville. He holds an adjunct professorship at Meharry Medical College and is an Assistant Clinical Professor in the Department of Health Policy at Vanderbilt University School of Medicine. Prior to moving to Nashville, he was the Deputy Commissioner of the Bureau of Epidemiology and Disease Control in the Chicago Department of Public Health from 2001 – 2007. From 1998 – 2001, Dr. Paul served as the Director of the Infectious Diseases Division of the Chicago Department of Public Health. Dr. Paul received an M.D. from the University of Illinois College of Medicine, an M.PH from the University of Illinois School of Public Health in Epidemiology and Biometry, and a B.S. in Biological Sciences from Stanford University.

Dr. Eduardo Sanchez (Policy, Healthcare) serves as Chief Medical Officer (CMO) for Prevention for the American Heart Association (AHA). He brings an interest and experience in prevention and population health to AHA. He served as Deputy Chief Medical Officer for the AHA from April 2013 through 2014. Prior to joining AHA, he served as Vice President and CMO for Blue Cross and Blue Shield of Texas (BCBSTX). Dr. Sanchez led the Institute for Health Policy at the University of Texas (UT) School of Public Health as director from 2006 to 2008. From 2001 to 2006, he served as Texas' state health officer, Commissioner of the Texas Department of State Health Services from 2004 to 2006 and the Texas Department of Health from 2001 to 2004. And he served as the local public health officer in Austin-Travis County from 1994 to 1998. Dr. Sanchez currently serves as Chair of the National Commission on Prevention Priorities and the Texas Public Health Coalition. From 2008 to 2012, he served as chair of the Advisory Committee to the Director of the Centers for Disease Control and Prevention (CDC). He serves on the National Academies of Sciences, Engineering and Medicine's Roundtable on Obesity Solutions and on the Board of Directors of Trust for America's Health, AcademyHealth, the Public Health

Institute, and the CATCH Global Foundation. Dr. Sanchez obtained his M.D. from the University of Texas (UT) Southwestern Medical School in Dallas, an M.P.H. from the UT Health Science Center at Houston School of Public Health, and an M.S. in biomedical engineering from Duke University. He holds a B.S. in biomedical engineering and a B.A. in chemistry from Boston University. Dr. Sanchez is board certified in family medicine.

Dr. Kevin Thomas (Media, Community) is a physician-researcher in the Department of Cardiology at Duke University School of Medicine. Dr. Thomas is also the creator the "Check It. Change It." hypertension program that was implemented in Raleigh-Durham, NC. He obtained his M.D. from the University of North Carolina at Chapel Hill. He completed his residency in medicine, went on to become the chief resident in medicine and completed fellowships in cardiology and medicine at Duke University. Dr. Thomas has received grants to further develop and pilot technology-based programs to reduce racial disparities in cardiovascular health and has published over 40 peer-reviewed articles in cardiovascular medicine.

Dr. Ronald Victor (Community) is a cardiovascular physician-scientist with 30 years of continuous support from the National Institutes of Health (NIH) for clinical and translational research on community-based health disparities research on hypertension in African-Americans and on neural mechanisms of hypertension and vascular regulation.

During his tenure at the University of Texas Southwestern, Dr. Victor was program director on several large, multidisciplinary research grants, including a National Heart, Lung, and Blood Institute (NHLBI) Specialized Center of Research on Ischemic Heart Disease in Blacks and the Dallas Heart Study. He also was co-director of the Donald W. Reynolds Cardiovascular Clinical Research Center. Dr. Victor was principal investigator on a previous NHLBI-funded cluster-randomized trial of a barber-based intervention for hypertension control in African-American men.

He is principal investigator on a new R01 project through the national Health Services Organization and Delivery study section for a second cluster-randomized trial to test the efficacy, sustainability and scalability of an enhanced intervention model that utilizes community-based clinical pharmacists to link the barber-based intervention to healthcare reform. Dr. Victor was recruited to Cedars-Sinai in July 2009 to develop NIH-funded clinical research programs in the Heart Institute, where he holds the Burns and Allen Chair in Cardiology Research. In addition to his clinical research on hypertension, Dr. Victor is a clinical hypertension specialist. He was Hypertension Division Chief at UT Southwestern for 12 years and now is director of the Cedars-Sinai Hypertension Center, an American Society of Hypertension comprehensive hypertension center. He is co-author of the textbook Kaplan's Clinical Hypertension.

Dr. Janet Wright (Policy, Media) is the Executive Director of Million Hearts®, an HHS national initiative, co-led by the Centers for Disease Control and Centers for Medicare and Medicaid Services, with the explicit goal to prevent one million heart attacks and strokes in the US by 2017.

From 2008 to 2011, Dr. Wright served as Senior Vice President for Science and Quality at the American College of Cardiology. In that role she provided medical and scientific oversight of clinical guidelines, performance measures, health policy statements and appropriate use criteria; quality improvement projects; and the National Cardiovascular Data Registry, a suite of databases containing more than 12 million patient records in both inpatient and outpatient care settings.

Dr. Wright practiced cardiology for 23 years in Chico, California, and during those years she served on ACC's Board of Trustees, NCQA's Physician Program Committee, and the Center for Information Therapy, a non-profit organization committed to the provision of personalized health information during each health encounter. Her primary interests are the design and implementation of systems of care to achieve optimal outcomes for patients and the full deployment of hooks, tricks, and cues that help people get and stay healthy.

Appendix B. Literature Review Search Terms and Criteria

Community Settings

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Hypertension, blood pressure; community; community-based; review, awareness, screening; outreach; African American; church (last 10 years), school, worksite, workplace (last 10 years)

Policy Interventions

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Hypertension & policy; "high blood pressure" & policy

Policy: Medication/Prescribing Policies

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Medication & hypertension & policy; prescribing & hypertension & policy

Policy: Clinical Practice Guidelines, Decision Support, etc.

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Hypertension & policy; "high blood pressure" & policy; hypertension & Primary Care Information Project

Mass Media Interventions

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Hypertension, blood pressure, mass media, media campaign, public education, social marketing, social media, health communication, mobile

Healthcare Settings

Timeframe:	Last five years
Search fields:	Search of all fields, English-language only, human subjects only
Search terms:	Hypertension and healthcare and algorithm; hypertension or "high blood pressure" & healthcare or pharmacist or nurse or physician or clinic or hospital & effect or impact or intervention

Appendix C. Literature Summaries

Community

Community-based programs play important a role in raising awareness of hypertension, increasing detection and treatment of hypertension, promoting lifestyle modifications, and supporting clinical interventions. A growing body of evidence supports lifestyle and clinical management strategies, such as self-measured blood pressure monitoring (SMBP),[1] blood pressure monitoring combined with additional support (such as counseling, education sessions, and electronic or web-based tools)[2], behavioral interventions to improve medication adherence[3], patient education enhanced with positive affirmations[4], and engaging community health workers (CHWs) in team-based care.[5] Implementation of these strategies in community settings may help increase hypertension screening and control. These community-based implementation strategies can be categorized into two groups:

1. Implementation of proven interventions in community settings
2. Culturally sensitive interventions targeted to underserved populations.

1. Implementation of proven interventions in community settings

Broad, community-based interventions that integrate allied health professionals into community settings may lower blood pressure rates among hypertensive individuals. For example, the Community Outreach and Cardiovascular Health (COACH) program is a nurse practitioner/CHW intervention that provides tailored educational and behavioral counseling with the goal of lifestyle modification and improved treatment adherence.[6] The COACH program produced lower systolic (-6.2mmHg) and diastolic blood pressures (-3.1mmHg) among participants, when compared to individuals who received usual care. Similar to the COACH program, "Check It, Change It" is a tiered intervention that provides hypertension assessment and integrates a patient-facing web portal with SMBP and face-to-face counseling conducted by allied health professionals. Participants in the "Check It, Change It" intervention had greater reductions in blood pressure and improved rates of hypertension control than individuals not in the intervention.[7]

These evidence-based programs need to be implemented in trusted community settings that participants already frequent, such as faith-based organizations, worksites, and schools. Faith-based organizations are natural sites for screening, referral, and education and have broad reach among members and nonmembers.[8] Implementation in faith-based organizations confers trust on those conducting the intervention; including community nurses[9], physicians, and lay volunteers.[10] Interventions conducted in faith-based settings have demonstrated success, such as lowered blood pressure, lowered risk of cardiovascular disease, improved nutrition, and better weight control.[11] Worksites, which provide support networks and accountability, are also ideal community settings for screening, treatment, and education. Worksite hypertension programs are more effective when implemented by nurses and when individuals can participate at work.[8] There is some evidence suggesting that Internet-based worksite programs are successful, especially when targeted to high-risk employees and combined with face-to-face counseling and environmental modification, such as space for physical activity and reduced sodium food options.[12] Schools are increasingly important sites for intervention, given the rising prevalence of hypertension among school-aged children[13] and the potential for spillover effects to other family members.[14]

2. Interventions targeting underserved population

African Americans are disproportionately affected by hypertension: they experience a higher prevalence and worse blood pressure control, earlier onset of hypertension, and greater risk of stroke.[15] Persistent disparities are also seen for Hispanic communities, such as lower rates of 1) awareness about hypertension, 2) treatment for hypertension, and 3) hypertension control.[14] Innovative interventions have identified trusted community settings to reach out to these underserved populations. For example, one intervention uses African American barbershops to reach black men.[15] Using barbershops to target high-risk African American men demonstrated improvement in rates of hypertension control (8.8% mean reduction)[16] and found that referral to hypertension specialists was associated with greater blood pressure reduction, compared to referral to primary care providers.[17] Another innovative intervention, Promotores de Salud, takes advantage of culturally and linguistically concordant community health workers in Hispanic communities.[15]

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Policy

Policies to improve hypertension prevalence and control rates can be implemented at the federal, state, and municipal level. While some policies are more easily implemented at the federal or state level, they could be considered at the municipal level. Policies, such as these, include:

1. Dietary policies
2. Improving access to hypertension treatment options.

Working with the appropriate stakeholders and understanding the political environment of Nashville and Tennessee will be crucial to implementing recommended policies for reducing the prevalence and burden of hypertension in Nashville.

1. Dietary Policies

Dietary policies to reduce hypertension include 1) increasing the availability of and incentivizing healthy foods at stores; 2) labeling food products in both stores and restaurants with nutrient content; 3) promoting voluntary reductions of sodium levels in processed food, 4) mandatory reductions on sodium levels in processed foods. There is conflicting evidence on the impact of restricting dietary sodium on hypertension control and the regulation of hormones that play a role in regulating sodium levels.[18,19,20] However, policy modeling studies suggests that the that regulating dietary sodium would not only reduce the prevalence of hypertension but would also reduce its burden: reducing dietary sodium intake by 3g for the U.S. population would prevent new cases of coronary heart disease (60,000-120,000), strokes (32,000-66,000), heart attacks (54,000-99,000), and deaths (44,000 to 92,000).[21,22] Reducing dietary sodium also improves health equity, having a greater effect on the outcomes of subgroups disproportionately affected by hypertension and cardiovascular disease, including African Americans and women.[21] Of potential dietary policy interventions, mandating lower amounts of sodium in processed foods may have the greatest effect on life years saved.[5] Despite the positive effects of these policies, there may be significant barriers to implementation in a community setting, including low demand for low-sodium foods, difficulty amending long-term food procurement contracts, and consumer demand for prepackaged foods.[23]

2. Improve Access to Hypertension Treatment Options

Treatment for stage 1 hypertension in older adults (45-74 years of age) and for stage 2 hypertension is cost-effective.[24] In fact, optimal medication adherence for stage 2 hypertension that prevents progression to cardiovascular disease would be cost-effective even if the strategies to improve adherence doubled the costs of treatment.[24] One way to improve hypertension-related outcomes, including medication adherence, may be to design insurance coverage options to provide enhanced, disease-related benefits and lower the out-of-pocket costs for anti-hypertensive medication; this type of insurance design for a specific disease or condition is called Value-Based Insurance Design (VBID). Lowering out-of-pocket costs for anti-hypertensive medication improves medication adherence, [25,26] but there is little evidence for improvement on clinical and economic outcomes.[27] Providing enhanced insurance benefits, such as pharmacist-led coaching, payments to an enrollee's health savings account, and reduced cost-sharing for medication, for hypertension significantly lowered blood pressure and lipid levels and met national clinical guidelines for hypertension control, compared to individuals enrolled in a standard insurance plan.[27]

Evidence suggests that self-measured blood pressure monitoring (SMBP) when combined with additional support, including one-on-one counseling or telephonic support, produces greater blood pressure reductions than usual care.[28] SMBP units that meet preferred specifications, including automation and memory storage capacity, coupled with medication adherence and lifestyle medication counseling may be cost-prohibitive if not covered by insurance.[28] Many health insurance plans do not cover SMBP units and relevant support services.[28] Creating a VBID-like insurance program that covers SMBP units and additional counseling for those with diagnosed hypertension may increase access to and use of these units.

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Media

Mass media campaigns have been used for numerous health issues to 1) increase awareness and knowledge, 2) encourage utilization of health services and products, and 3) promote health behaviors. These mass media campaigns may improve rates of prevention, detection, treatment, and/or control of the targeted health issue and can be categorized into two types of outlets:

1. Traditional media outlets;
2. Non-traditional media, including social media sites.

Although traditional media outlets remain dominant in these campaigns, non-traditional outlets are increasingly attractive due to their broad reach and cost-effectiveness.

1. Traditional media

While there is little evidence on the effectiveness of traditional media campaigns for improving hypertension outcomes, there is significant evidence for the use of traditional media campaigns in tobacco control. Tobacco control television ads reduce youth initiation and increase quit attempts with repeated exposure.[29,30] In hypertension, short-term media awareness campaigns produced modest increases in awareness[31,32] and knowledge[32] with little evidence that these increases persisted over time.[3] Similar to tobacco, campaigns with more comprehensive messages and increased duration may produce larger and more sustainable gains in knowledge and awareness. For example, a two-year mass media campaign in North Carolina, targeting multiple cardiovascular risk factors and providing lifestyle recommendations, demonstrated greater decreases in systolic blood pressure versus the comparison community.[33] Additionally, supplementing media campaigns with other interventions, such as screening, lifestyle modification, and support resources, produces greater outcomes than stand-alone media campaigns.[34,35] For example, an extended-duration, community-wide education program focused on cardiovascular risk factors demonstrated greater blood pressure reduction when compared to cities without the intervention.[36]

Traditional mass media campaigns also have the potential to increase utilization of health products and health services. These campaigns combined with distribution of a health product (free or at a reduced price) may encourage uptake of the intended health behaviors.[37] For example, the distribution of pedometers to increase physical activity leads to greater engagement in the behavior.[37] These tactics might be applied to hypertension-related products, such as sphygmomanometer and blood pressure monitor, to lower rates of blood pressure. Additionally, media interventions are successful in increasing health services utilization in other fields[38], including tobacco control.[39] Literature also suggests that celebrities' disclosure of their diseases and endorsement can influence the public and promote use of preventive care, such as colon cancer screening.[40] The evidence and lessons learned from these mass media campaigns may help create a hypertension campaign to drive individuals to seek relevant and appropriate healthcare services.

2. Non-traditional media

There is evidence to suggest that online interventions increase knowledge and promote greater behavioral changes than non-Web-based interventions among users.[41] While social media sites may have broad reach, interventions using these sites often have low rates of use and poor retention.[41] Interventions using general social media outlets, such as Facebook, produce greater rates of retention than health-focused social media outlets; however, engagement in and activity on hypertension-related Facebook pages is low.[42] Because many social media sites are not monitored for accuracy, open media platforms often distribute incorrect or misleading information: roughly a third of hypertension-related YouTube videos contain misleading information, with misleading videos having significantly more views than factually-accurate videos.[43]

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Healthcare

Historically, hypertension diagnosis, treatment, and control have occurred in traditional healthcare settings by physicians. Hypertension treatment in the healthcare system, however, is often low touch and can result in low medication adherence and suboptimal control, especially in low-income and racial/ethnic minority populations. In return, healthcare institutions interact with these patients via the emergency department and inpatient settings: poor medication adherence results in greater rates of potentially preventable hospitalizations for hypertension and higher costs.[44] Existing hypertension treatment and control interventions work better for female, older, and moderate-to-high-income participants.[45] Novel healthcare interventions to improve hypertension diagnosis, treatment, and control among all hypertensive individuals fall into two categories:

1. Utilizing existing electronic infrastructure
2. Using non-physician health professionals to implement tailored, high-touch interventions

1. Utilizing Existing Electronic Infrastructure

The use of clinical decision support systems (CDSS) in combination with Electronic Health Records (EHRs) or Electronic Medical Records (EMRs) is mandated under meaningful use legislation, but hospitals must only implement one CDSS that is of high priority.[46] Using a CDSS for hypertension screening, treatment, and control, improves screening rates and other preventive care services for hypertension by 10-20% but has no effect on physicians' decision to conduct guideline-based clinical tests for hypertension.[47] Multiple studies suggest that the use of CDSS for hypertension results in higher rates of blood pressure control.[47,48,49] While there is some evidence that CDSS lower diastolic and systolic blood pressure, other studies suggest that this evidence is inconclusive.[47,50] EHR-integrated CDSSs for cardiovascular disease (CVD) prevention should include at least one of the following: 1) screening and preventive care reminders that are tailored for various providers; 2) patient history, risk factors, and clinical tests to assess a patient's risk for developing CVD; 3) evidence-based treatment options to prevent CVD in patients at high risk; 4) tailored behavior modification suggestions, such as smoking cessation; 5) alerts when CVD risk factors are not well maintained.[51]

Additionally, evidence suggests that scouring EHRs or EMRs may help identify patients who have multiple high blood pressure readings but do not have a definitive diagnosis of hypertension or have not been prescribed an antihypertensive.[52] These individuals "hiding in plain sight" may account for up to 40% of the entire adult patient population.[52]

2. Non-Physician Health Professionals

Recent evidence suggests that employing non-physicians to provide team-based care, promote medication adherence, and using motivational interviewing to promote behavior change may be just as effective as if these interventions were used by physicians.[53] Interventions that use teams staffed with pharmacists and nurses can reduce diastolic[10] and systolic blood pressure[54,53] and improve medication adherence.[55] Evidence suggests that weekly calls and emails from nurses to those at risk of CVD lower a number of risk factors, including lipid levels and blood pressure.[56] Additionally, pharmacist-directed, nurse-led hypertension case management produces outcomes similar to physician-directed, nurse-led case management.[52] These non-physician healthcare providers may also be more informed about where to find free and reduced cost medications. In fact, the formation of nurse-led, physician-directed clinics could act as a "bridge" between acute and primary care settings for those with long wait times to see a primary care physician.[57]

Healthcare interventions that are tailored to specific individuals and subgroups of the population may produce greater gains among those individuals than non-tailored behavioral interventions.[58,59] Among African Americans with hypertension, interventions that include medication intervention and behavioral counseling produced lower diastolic and systolic blood pressure readings than either intervention alone.[59]

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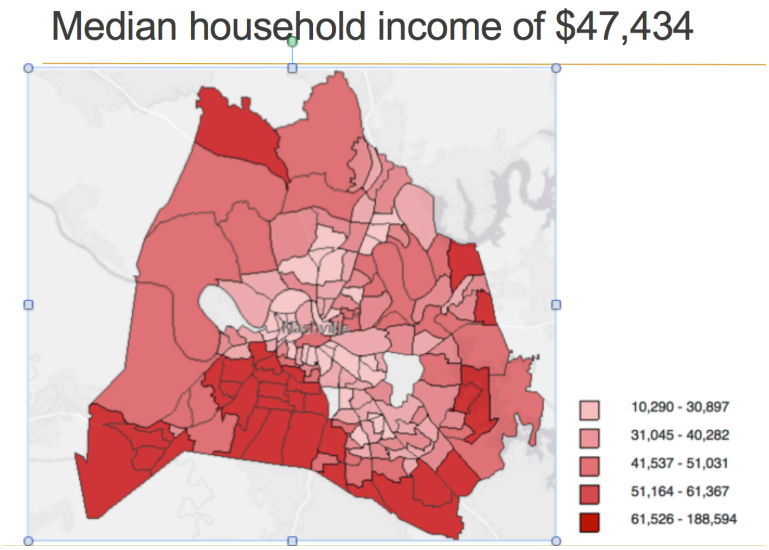
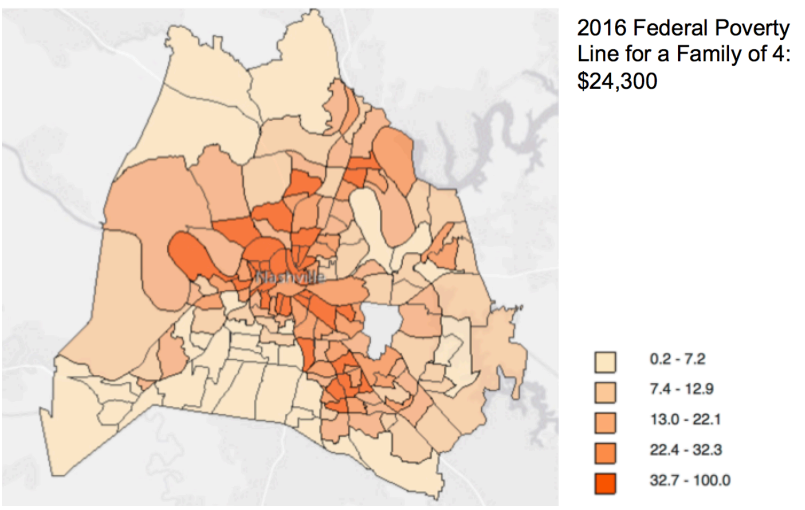
Appendix D. Nashville Characteristics

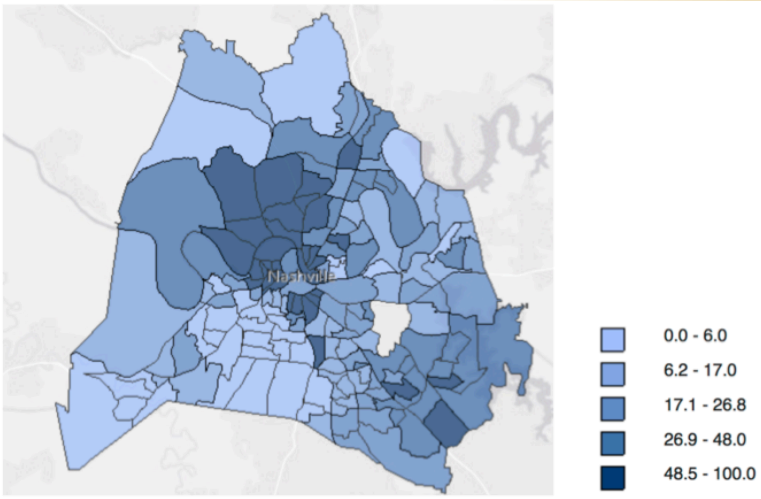
Total Population	648,048
Median Age	34
Percent over age 18	78%
Median Household Income	$47,434
Percent Living in Poverty	19%
Percent Uninsured	16%
Percent Covered by Medicaid	18%
Percent African-American	28%
Percent Hispanic/Latino	10%
Percent with High School Diploma	86%



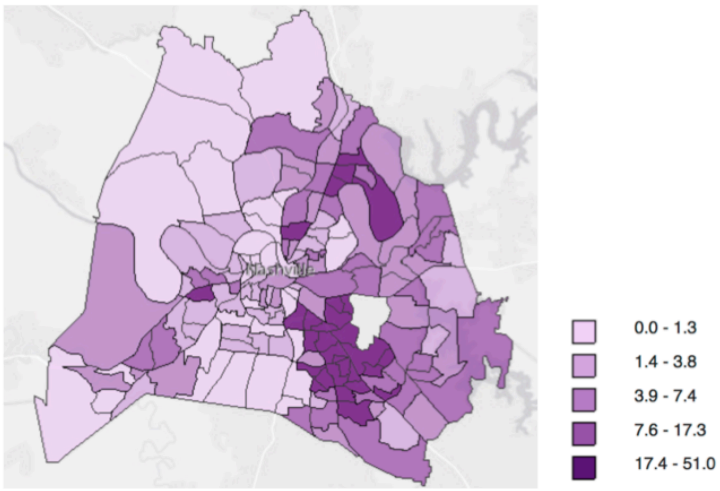


Source: 2010-2014 American Community Survey (ACS) estimates

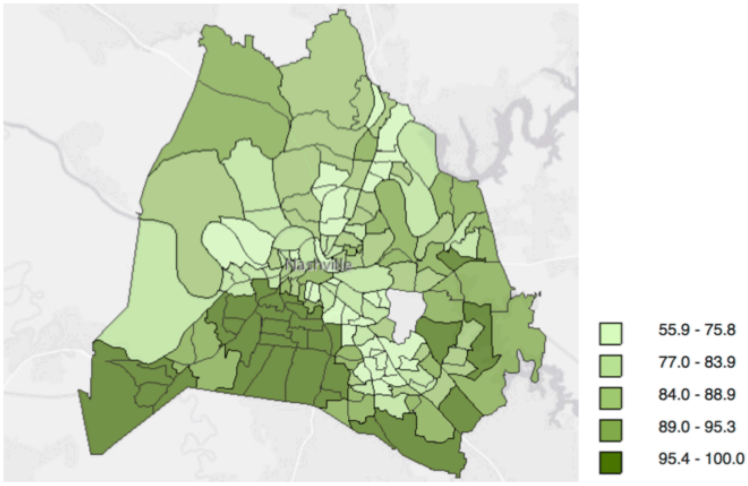
28% of residents are African-American



10% of residents are Hispanic or Latino

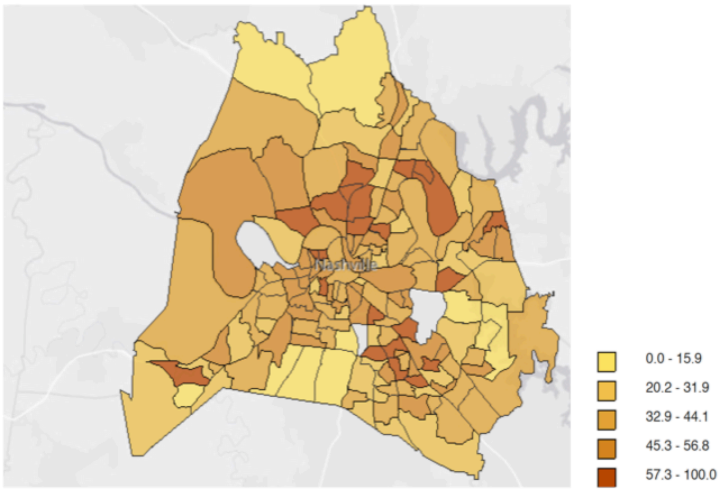


86% of adults have a high school diploma



Source: 2010-2014 ACS estimates

42% of households' gross rent is more than 35% of household income



Source: 2010-2014 ACS estimates

Appendix E. Recommendations and within-domain rankings from in-person meeting

Community:

1. Establish trust relationships with community stakeholders
2. Expand worksite programs and support hypertension coverage policies.
3. Opportunistically establish linkages between community programs and health care providers.
    a. Fire stations w/EMTs
    b. Barber shops, Promotores
    c. YMCAs & rec centers
    d. Churches/faith-based
    e. Pharmacies

Policy:

1. Eliminate financial barriers to appropriate medication therapy
2. Push for healthy food orientation across organizations in Nashville
3. Enhance access to blood pressure monitors
4. Encourage attention to blood pressure control in value-based payment models and employer wellness programs.

Media:

1. Use focus groups to understand effective messages, messengers, and channels for Nashville regarding hypertension
2. Draw on existing (low-cost) materials from other campaigns (e.g., AHA and Million Hearts)
3. Find local champions and celebrities to drive “eyes” to the campaign

Healthcare:

1. Convene providers: Aim to foster “learning collaborative”
2. Provide hypertension training and certification for mid-level providers; promote team-based care model
3. Collect and share data using common data model