



Green & Healthy Homes Initiative®

Chattanooga Initial Feasibility

Project deliverables

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Executive Summary

Initial feasibility overview

Over the course of three months, GHHI worked with partners in Chattanooga to undertake a feasibility study to assess the potential implementation of an integrated energy, housing, and health services delivery model for low and moderate-income households and communities in Chattanooga.

The project focused on five key areas of technical assistance: project planning, stakeholder analysis, data needs assessment, cost-benefit analysis, and payer engagement, which are outlined below. This report will focus on the latter four.

Technical Assistance	Overview
Project planning	Align expectations, structure an organized project team, and establish efficient project management procedures.
Stakeholder analysis	Identify key stakeholders who may support the project's advancement; plan stakeholder engagement during the project.
Data needs assessment	Assess valuable data resources for the project's advancement, identify their utility for their project, and secure access to required project data
Payer engagement	Identify potential payers for the integrated services
Cost-benefit analysis	Utilize publicly-available information to analyze the financial efficiencies and benefits associated with expected outcomes of the integrated delivery model

Summary findings

Based on the findings of the initial feasibility study, there is a high need and clear interest in Chattanooga for a comprehensive asthma intervention for high asthma utilizers. The findings, which are outlined in the report below in more detail, are summarized here:

Stakeholder analysis	There is sufficient interest from health and energy organizations in creating a comprehensive asthma intervention to test the concept with a pilot. There were no stakeholders that were against the project.
Data needs assessment	Thus far the project has only been able to secure publicly available data from the Hospital Discharge Data System. Access to claims data from a health plan will be needed in the future for the project to move forward to reimbursement.

Payer engagement	There is significant interest from health plans in Tennessee for these types of projects and GHHI is working with United to create a contract template for value-based purchasing that could be utilized.
Cost-benefit analysis	The cost-benefit analysis utilizing public data showed a positive return on investment for the comprehensive asthma intervention

While the project is in the very early stages, the findings of the initial feasibility study indicate that a pilot project is a viable next step. The operational stakeholders are bought-in to the project, the available data shows a great need and potential for return on investment, and the Medicaid health plans in the state have expressed interest in a similar project and structure in Memphis. The pilot would allow the partners to build and test an operations plan, create a more accurate budget, and better understand the needs of the population while working with the health plans to access and analyze data.

Upon review and discussion of the initial feasibility findings, the Chattanooga team has decided to proceed with assembling pilot funding and preparing project partners for a pilot through healthy homes and asthma training.

Overview

Project partners

The team has a diverse set of dedicated partners working to create healthier homes and healthier communities for those that live in Chattanooga. Lead by green|spaces, a community-based organization dedicated to advancing the sustainability of living, working, and building in Chattanooga, the partners have come together to assess the potential to implement a comprehensive asthma intervention.

Healthcare partners

Children's Hospital at Erlanger is a full-service facility located in Chattanooga and is one of only four Comprehensive Regional Pediatric Centers in the state of Tennessee. It is part of the Erlanger Health System, a multi-hospital system with five hospitals based in Chattanooga. Erlanger is the 7th largest public hospital in the country. Erlanger has provided access to its hospital data for analysis (as of the writing of this report, we are still awaiting that data) and is exploring the potential to serve as the primary contractor for a value-based purchasing agreement with a health plan(s). Erlanger could also be a referral source for the program.

Service provider team

LifeSpring is a community health center that provides pediatric medical services, advocacy, and education in Chattanooga. The clinic serves families with no insurance, Medicaid, and private insurance. Currently LifeSpring has two Community Health Workers (CHWs) that each work part time and have a wide scope, which includes care coordination, home visiting, connecting families to community resources, and community education. One of the CHWs speak Spanish and both are very familiar with the community. LifeSpring is interested in potentially serving as the service provider for the home visiting and education portion of the intervention. As a certified Medicaid provider, LifeSpring could also explore the potential to serve as the primary contractor for a value-based purchasing agreement with a health plan(s).

EPB is one of America's largest publicly owned electric power providers. Owned by the city of Chattanooga, it was created in 1935 as an act of the Tennessee Legislature to provide electric power to the area. It currently provides the Chattanooga area with electric and telecommunications services and is a key partner in managing and implementing the Weatherization Assistance Program (WAP). In addition, EPB provides Chattanooga residents with the Home Energy Upgrade program to create more energy efficient homes that reduce energy bills for owners. Through this program EPB saw that residents were getting healthier and wanted to explore working more closely with health care to expand upon and measure these benefits. EPB works closely with the Tennessee Valley Authority (TVA). EPB is interested in potentially providing the home assessment and, through contractors, remediation portion of the intervention.

Tennessee Valley Authority (TVA) is a corporate agency that provides electricity for businesses and local power companies in Tennessee and parts of 6 other states. TVA works closely with EPB in Chattanooga to implement the Home Energy Upgrade program. TVA has also invested in the WAP program in the Tennessee Valley and is working to pilot a new product to make the WAP program more efficient and data driven – WAP Easy. TVA is interested in the intersection of energy efficiency and health and is deeply invested in the health and well-being of Tennessee.

Project management partners

green|spaces is a community-based organization in Chattanooga that is working toward regional sustainability through multiple programs that progress the way the people of Chattanooga live, work, and build. green|spaces has provided much of the project management necessary to make this feasibility study a reality. The organization is also interested in potentially providing the necessary training for community health workers and healthy homes assessors for the project to move forward.

Technical assistance partners

Green & Healthy Homes Initiative (GHHI) is a nonprofit organization whose mission is to break the link between unhealthy housing and unhealthy families. GHHI has 30

years of experience in fundraising, delivering high-quality evidence-based services, working with governments in jurisdictions around the country, and forming innovative cross-sector partnerships. GHHI has provided support to over 12 sites seeking to build strong, comprehensive asthma care management services reimbursed by healthcare and utilized this expertise to provide technical assistance to this project.

Stakeholder Analysis

Overview

The project partners identified potential stakeholders that will be important to speak with about the project either in the short or long-term. As the needs of the program developed and changed, stakeholders were added to the list. This section outlines some of those key stakeholders, documents relevant conversations that were had with them, and provides analysis on how those stakeholders fit into the project. The accompanying stakeholder analysis workbook provides a list of all identified stakeholders and notes points of contact and any conversations with them about the project.

Interactions with key stakeholders centered around three main project needs: operational partners to provide services to the community, data partners to provide information for analysis, and economic partners to understand the interest of local funders to participate in a potential project.

Operational stakeholders

Research findings from the NIH, the Centers for Disease Control, and other clinical experts indicate that asthma is triggered by environmental factors but is controllable through comprehensive asthma care management. According to the National Heart, Lung, and Blood Institute Expert Panel Report 3 (NHLBI EPR-3) the four components of asthma care management are 1) assessment and monitoring of asthma severity and control, 2) education for a partnership in care, 3) control of environmental factors and comorbid conditions that affect asthma, 4) and medication.

A key need for this project is operational partners to provide evidence-based services to the asthmatic community in Chattanooga. As referenced above, there are medical, educational, and environmental aspects of the recommended intervention. Erlanger Children's Hospital along with other clinics and health care providers in the area are already providing clinical services to asthmatic patients, but a landscape analysis in Chattanooga uncovered that the recommended asthma education and control of environmental triggers was

not being provided in a coordinate way in the area. The analysis focused on identifying and connecting stakeholders to fill these key roles to build a comprehensive program.

Asthma education and home visiting

The stakeholder analysis did not identify any organizations providing asthma home visiting services in Chattanooga, but we did speak with several organizations providing similar services in the area to get a better idea of the need and understand where capacity could be built. The most notable conversations were had with LifeSpring Community Health, Hamilton County Department of Health, and Chattanooga Allergy Clinic.

LifeSpring Community Health

Background: LifeSpring Community Health is a community health clinic that provides medical services, health education and promotion, and community advocacy in Chattanooga. LifeSpring employs two part-time community health workers (CHWs) that focus on care coordination, connecting families to relevant community resources, community education, and home visits. One of the CHWs speaks Spanish. The CHWs are funded through a grant that will end in August 2018 and LifeSpring is dedicated to keeping them onboard and increasing their hours.

Potential for project: LifeSpring is very interested in participating in the project, either as a service provider or referral source (or both). They are interested in the potential to train their current CHWs in asthma education and increase their hours to accommodate more home visits or hiring another CHW focused on asthma. They are open to participating in a pilot as well as long as the intention is to have them provide services for the larger project if it moves forward.

The main point of contact at LifeSpring is Dr. Michele Pickett.

Hamilton County Department of Health

Background: The Health Department has multiple programs that provide home visiting services in Chattanooga, mostly focused on children and pregnant women. These include the Children's Special Services program, which provides care coordination for parents of

children ages 0-21, Parents as First Teachers, a home visiting program for parents of children prenatal to five, and Baby and Me, a weekly program for pregnant women to assist with smoking cessation. The Public Health Promotion Department also provides a six-week “Living Well with Chronic Conditions” program led by Chelauna Sterling, the Public Health Educator for Chronic Conditions. This program is mostly focused on diabetes.

The Health Department also employs around six public health educators, most of whom do not work full-time. While their roles differ, their scope often includes event coordination, outreach campaigns, and assisting the City in implementing health initiatives.

Potential for project: The project should consider working with the Health Department to create a referral partnership. The Department’s programs could be beneficial to the people the project will serve and vice versa. If the project decides to do an asthma-specific health worker training, the public health educators could also be invited.

Chattanooga Allergy Clinic

Background: Chattanooga Allergy Clinic provides asthma and allergy care to people in Chattanooga. While we do not have exact numbers, the point of contact believed that most of the patients are on commercial insurance, but they do have a substantial subset of Medicaid patients. The Clinic is heavily involved in the community, hosting outreach events and activities in schools and other public places. The Clinic does not provide home visiting services but believes their patients could greatly benefit from the services the project is proposing to provide.

Potential for project: The Clinic is interested in potentially helping the project in three ways:

- Identify patients and provide referrals to the program once it is up and running
- Provide experts (doctors, nurses) to review project operation plans to provide input on design
- Provide data and/or help to evaluate data

The projects main point of contact at the Chattanooga Allergy Clinic is Adam Medlock, CFO.

Environmental triggers

While our landscape analysis did not identify any organizations in Chattanooga providing asthma healthy homes assessments and remediation, there are organizations and programs that provide energy efficiency assessments and home upgrades. These organizations/programs can either build their capacity to include healthy homes evaluations or partner with an organization that is willing to build out that capacity. CHWs can also be trained in healthy homes assessments and can then provide the initial home evaluation, referring clients that need major remediation to an external organization for further assessment and repairs.

Home Energy Upgrade Program

Background: The Tennessee Valley Authority (TVA) and local utility EPB have partnered to provide the Home Energy Upgrade program (HEU), which began with a pilot of 14 homes in 2015 and plans to continue at a larger scale. The goal of the HEU is to reduce energy consumption by at least 25% by spending \$10 per square foot on home energy upgrades for low-income households in the Avondale section of Hamilton County. The program is solely for home owners and to qualify, homes must the HUD Poverty Guidelines. Since the pilot in 2015, the program has served around 75 homes.

Nine individuals at EPB were involved in the development and execution of the HEU pilot, with approximately two FTEs. EPB directly employs home auditors to prepare a scope of work and subcontracts the remediation to a list of approved subcontractors. EPB's auditors do not have training in healthy homes assessments.

Below is a list of services that were provided to homes in the HEU pilot along with the number of homes that received each and the average cost.

Service	# homes	Avg cost, \$
Air seal & insulate	14	1,776
Install heat pump	10	5,178
Replace new door(s)	10	1,343
Install window(s)	11	3,485
Install gutters	2	293
Duct work	4	3,298
Front door threshold	1	150
Install HVAC	1	5,400
Ground cover crawl space	1	120
Electric service upgrade	1	1,670

Potential for project: While the HEU program is only for home owners, the project could coordinate with EPB to offer eligible participants services through both programs. Ideally, TVA would expand the scope to include rental-occupied properties with landlord consent. EPB is considering training the home energy auditors in healthy homes principles, which would allow the HEU auditors to potentially perform healthy homes assessments for the project.

It is important to note that homes are chosen based on geographic preference, so it is possible that homes referred through the asthma project will not be prioritized or completed in a timely manner.

Habitat for Humanity

Background: For the past four years, Habitat has been implementing the Neighborhood Revitalization program in Chattanooga. As of March 2018, they had undertaken 65 projects mostly located in Bushtown and Glasstown. The cost per home ranges from \$1,000-\$20,000. Much of the focus has been on indoor air quality. Habitat for Humanity has also worked closely with both EPB and TVA.

Potential for project: Habitat for Humanity could serve as a subcontractor to EPB/TVA to provide home remediation services to project participants. The project could also utilize their expertise with the communities in which they work to design the program, get referrals, and gain trust.

Weatherization Assistance Program (WAP)

Background: The WAP program in Tennessee is funded by the Department of Energy (DOE) and the Tennessee Housing Development Agency (THDA). In Hamilton County as well as nine others in South Eastern Tennessee, the program is administered by the South Eastern Tennessee Human Resources Agency (SETHRA). In Hamilton County, the WAP program is administered in partnership with EPB, who performs the energy audits, bids the projects out to subcontractors, and performs the quality control.

Hamilton County receives an allotment for 25 WAP jobs per year, the highest of any county in the South Eastern region. Applicants are selected based on a priority scoring rubric and others are placed on the waitlist. The scoring rubric favors households with children under 6, elderly, and disabled individuals and those with a large energy burden (based on income) and high energy usage (based on cost). The WAP program is for both rental and owner-occupied properties where the total income is equal to or less than 200% of the FPL for the household size¹. According to SETHRA, each home is eligible for \$7,200 for WAP services (money from DOE) and \$10,000 of home and safety services (money from THDA). Information in the Tennessee WAP State Plan states “Sub-grantee agencies will be provided a specific dollar amount equal to 14.81% of their Program Operation funding that may be used to address health and safety issues as permitted in Tennessee’s health and safety plan. Funds may only be spent in homes where weatherization work is being performed, although there is not a limit per home. Only those health and safety items that are necessary to effectively perform or as a result of weatherization work will be permitted.”²

Potential for project: Homes are ineligible for WAP services if they fail to meet certain health and safety standards, some of which can be addressed through the comprehensive asthma intervention (e.g. moisture problems, pest infestation)³. As mentioned above, some health and safety money has been allocated to the WAP program to address these

¹ <https://s3.amazonaws.com/thda.org/Documents/Business-Partners/Grant-Administrators/Weatherization/WAP-State-Plan-Master-File-2017.pdf>

² Ibid.

³ Ibid.

issues, but according to conversations with SETHRA, this is not always enough. The project could work in coordination with the WAP program to braid funding for homes that are eligible for the project and WAP. This will allow the project to utilize WAP, health and safety, and the asthma project funding to address more issues in homes. The project could also refer clients to the WAP program and vice versa.

City of Chattanooga, Department of Economic and Community Development

Background: In 2018, the City of Chattanooga received a \$1.65M grant from the Department of Housing and Urban Development (HUD) to address lead contamination and create healthier homes. The grant will allow work to be done in 75 homes in Chattanooga, 40 of which will be eligible for supplemental healthy homes funding (e.g. to address asthma triggers). The City would like to do more than 40 but does not currently have the funding. These homes have a \$5,000 cap per project for healthy homes remediation.

The City will be training assessors in-house utilizing the Healthy Housing Solutions training curriculum for healthy homes assessments. Thus far, the plan is to have three assessors (Faye Ralston, Jennifer Bissett, and Doug Smith).

Potential for project: While first priority for this funding will be for homes with children with elevated blood levels (lead), serving homes with other health issues, particularly asthma, is the second priority. The project could potentially refer patients into this program to receive home remediation if someone in the home also has elevated blood levels. The City is also training three individuals in healthy homes assessments. If they have capacity, these individuals may be able to perform assessments for the project or serve as a trainer for healthy homes professionals in Chattanooga.

The projects main point of contact at the City of Chattanooga is Faye Ralston, Program Manager of Lead Hazard Control and Healthy Homes.

Data Needs Assessment

Data resources

There are three main sources of data for the project: government, Medicaid Managed Care Organizations (MCOs), and providers (e.g. hospitals). Each of these data sources will provide useful data to the project, but they are not all equal in their value. This section will assess the pros and cons of each source and discuss the steps taken thus far to acquire data from each.

Government

The Tennessee State Department of Health has a Hospital Discharge Data System (HDDS) that receives information from all inpatient discharges (form UB-92) and other selected patient visits from hospitals throughout the state.

The State accepted a request from GHHI to share data for Hamilton County by age group for patients discharged with a primary or secondary diagnosis of asthma. This data included the number of inpatient and outpatient visits by age group and the total amount charged for that age group for both hospitalizations and emergency department visits. This is the data that was used to build the preliminary cost-benefit analysis.

The benefit of this data is that it is publicly available, free to access, and does not require data agreements. It can give the project an idea of the scale of asthma utilization and its costs in Chattanooga. It is also more detailed than the much easier to access data on the Health Department's website, as it allows the project to see utilization and cost in absolute numbers by age group.

The drawback of this data is that it only provides information for costs incurred and services rendered at hospitals. Each patient likely has a much higher cost of care to their insurer, which is impossible to measure with this data. This data is also for hospitaliza-

tions and ED visits for all patients, not just those on Medicaid. Given that the data provides an absolute number of services, the project also needed to assume an occurrence rate (number of services per person) to complete the cost-benefit analysis.

Pros	Cons
<ul style="list-style-type: none"> Publicly available and free to access Sorted by County and age group Provides absolute numbers for services and costs No data agreements needed 	<ul style="list-style-type: none"> Cost information does not represent patient's full cost of care Data is for all patients from all insurers An occurrence rate needed to be assumed to get # of patients served

Providers

Providers, such as hospitals and clinics, have utilization and cost data that can be useful especially if the provider is going to utilize their own funding to pay for the intervention (e.g. hospital community benefit funding). GHHI is working with Erlanger Children's Hospital to perform a data extraction that can be analyzed for the cost-benefit analysis.

The benefit of this data is that it is more robust and detailed than the HDDS data, in that it should allow for sorting by insurance type and will give us an absolute number of unique patients in each trigger category (e.g. inpatient hospital visit). This data will also allow the project to analyze potential cost burden to Erlanger instead of to all hospitals in the County. Thus far, no data agreements have been identified as necessary.

The drawback of this data is the same as that of the HDDS data – it will not capture a patient's full cost of care, but instead will reflect just the cost of that patient to Erlanger.

Pros	Cons
<ul style="list-style-type: none"> Free to access 	<ul style="list-style-type: none"> Cost information does not represent patient's full cost of care

<ul style="list-style-type: none"> • Provides more detailed information than HDDS – insurance type, # unique patients in each trigger group • Understand cost to specific provider • No data agreements needed 	
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Medicaid Managed Care Organizations (MCO)

GHHI has worked with TennCare and the three MCOs in Tennessee (Amerigroup, BlueCare, United) on a similar project in Memphis with Le Bonheur Hospital's CHAMP program. For that project, TennCare provided statewide claims data to an actuarial firm, Milliman, to analyze Memphis-specific Medicaid data. An actuarial analysis was performed.

This data is available for Milliman to perform an actuarial analysis for Chattanooga, but the analysis is not free. The estimated cost for the analysis is \$20,000. Given that GHHI is unable to directly access this data, the analysis would need to be done by Milliman.

The benefit of this data is that it captures the total cost of care for all patients that meet the project's age and trigger criteria. It also encompasses data for all Medicaid covered patients in the state and is quite detailed, allowing for in-depth analysis.

Pros	Cons
<ul style="list-style-type: none"> • Access to data for all Medicaid patients in the state • Captures patients' full cost of care 	<ul style="list-style-type: none"> • Expensive to access and analyze • Data agreements including a BAA and potentially IRB needed

Cost-Benefit Analysis

Overview

Utilizing publicly available data from the state's Hospital Discharge Data System (HDDS) as well as information provided by the project partners, GHHI conducted a cost-benefit analysis to determine the health and financial benefits of the potential comprehensive asthma program in Chattanooga.

To accomplish this, GHHI undertook a process aimed at determining the net economic value of the prospective project by analyzing the costs associated with implementing the program and the potential savings associated with decreased health service utilization for those involved. The process was as follows:

- Gather and analyze data for Hamilton County from the HDDS, including number of asthma-related inpatient and outpatient services by age group and the hospital costs associated with those services;
- Determine the projected budget for the program in Chattanooga based on six similar GHHI projects across the US, including one in Memphis;
- Utilize research to determine the effectiveness of a comprehensive asthma program to understand cost savings associated with implementation;
- Build a model that calculated the savings accrued over time for those receiving the intervention and compare those savings to the cost of providing the program.

The purpose of the model is to allow practitioners and potential funders to easily understand the business case for an evidence-based program in Chattanooga. The model can be used to make the case to others, either internal or external, that a pilot implementation is or is not feasible. Given the data utilized for the model, the intended end payer is a health plan.

This model is not intended to serve as a full economic analysis upon which the project partners will negotiate final contract terms for reimbursement. If the project chose to move forward with implementation and health plan engagement, a more robust economic

model built with health plan claims data would need to be created. The limitations of this model are outlined in the “model limitations” section below.

Key findings

The following tables and graphs outline the key findings from the cost-benefit analysis. These key findings are based on inputs that can and should be examined and altered by the project partners. Immediately following the key findings is important information on the model inputs, assumptions, and limitations that should be kept in mind when reviewing the results.

If 110 participants, both adults and children, are enrolled in the program annually over five years and savings are evaluated and counted for ten, the potential average savings per person is \$12,813, giving the full program a 34.9% internal rate of return. With this design, the program is expected to breakeven in year 6.

Enrollment years	5
Participants, <i>annual</i>	110
Participants, <i>total</i>	550
Cost-benefit analysis	
Average savings per person, <i>USD</i>	12,813
Net present value (NPV), <i>USD</i>	2,024,757
Internal rate of return (IRR)	34.9%
Breakeven year	6
Total program cost, <i>USD</i>	3,289,334

The model breaks the data down into four subpopulations:

- Hospitalizations – peds: Children ages 0-18 that are in the data because they have had an asthma-related hospital visit from 2014-2016
- Hospitalizations – adults: Adults over 18 that are in the data because they have had an asthma-related hospital visit from 2014-2016
- ED – peds: Children ages 0-18 that are in the data because they have had an asthma-related emergency department visit from 2014-2016

- ED – adults: Adults over 18 that are in the data because they have had an asthma-related emergency department visit from 2014-2016

The model also analyzes the cost-benefit of each of these subpopulations:

Subpopulation	Participants, total	Average savings per person, USD	IRR	Breakeven year
Hospitalization - peds	50	26,690	128.3%	3
Hospitalization - adults	100	39,668	318.3%	2
ED - peds	200	4,149	-10.5%	-
ED - adults	200	4,579	-7.9%	-

From the data available at this time, the model shows that the ED populations would likely need to be subsidized by the savings accrued for the inpatient populations. It is important to note that because the data is aggregated, it is difficult to parse out the severe asthma sufferers within each subpopulation. The program could decide to target individuals with two or more ED visits, which will very likely have a higher cost per person and therefore a larger savings.

If the project decided to work only with children, the model shows that this is still a feasible option. The project would potentially be smaller in scale and have a longer payback period, but the return on investment from the data we have is still positive.

Model inputs and assumptions

While most of the data utilized for this model came from the HDDS, other inputs and assumptions were necessary. This section will outline the source and reason for those inputs and assumptions.

Evidence for efficacy of intervention

There is a robust base of evidence around the effectiveness of home-based multi-trigger, multi-component comprehensive asthma interventions. This means that the intervention addresses more than one trigger of asthma and combines more than one component (e.g.

education, environmental remediation). For this model, GHHI utilized a Systematic Review titled “Effectiveness of Home-Based, Multi-Trigger, Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity.”⁴

This paper reviewed 23 studies that tested the effectiveness of home-based multi-trigger, multi-component comprehensive asthma interventions in both adults and children, though 20 of the studies focused solely on children. The review found that asthma acute care visits were reduced by 0.57 visits per year for children. Results for adults were inconclusive due to the small number of studies.

The model utilizes 0.57 as the median reduction of asthma-related emergency room visits and hospitalizations for children. Given the lack of studies focused on adults, the model halves this number and utilizes a 0.285 reduction of asthma-related emergency room visits and hospitalizations for adults.

Determining services per person

The data provided from the HDDS was broken down by number of services *total* per age group and the costs associated with those services. To calculate savings *per person* the data on *total services* by age group needed to be converted to *services per person*. GHHI utilized its cache of reference class data from claims data collected from other sites to estimate a services per person scaling factor for Chattanooga. If in the future the project can secure claims data to analyze, these assumptions can be removed.

For children, the model utilizes the scaling factor seen among asthmatic children in Memphis, TN for both hospitalizations and emergency department visits. These numbers are 1.159 and 2.444, respectively. Simply put, this means that on average, each asthmatic child has 1.159 hospitalizations annually and 2.444 emergency department visits annually.

⁴ Crocker, Deidre D., et al. "Effectiveness of home-based, multi-trigger, multicomponent interventions with an environmental focus for reducing asthma morbidity: a community guide systematic review." *American journal of preventive medicine* 41.2 (2011): S5-S32.

A smaller number of GHHI's sites have analyzed claims data for adults. Unfortunately, Memphis did not. Instead, the model utilizes claims data from Rhode Island. These numbers are 1.856 and 1.016 for hospitalizations and emergency department visits, respectively.

Model limitations

This cost-benefit analysis model has limitations, largely due to the data we have thus far been able to acquire. If the team decides to move forward and pursue health plan claims data, a more refined and robust economic model will be created. The main limitations are outlined here:

- The data is from the Hospital Discharge Data System and does not include a patient's total cost of care, only the costs accrued at a hospital; this can cause savings to be understated
- The data for this model is for all asthma-related hospital and ED visits, not just those for individuals on Medicaid
- Given data limitations, model assumes that someone who visits the hospital or ED in year 1 would continue to do so in subsequent years; this can cause savings to be overstated
- The evidence for asthma intervention is expressed in reduction of services and the model uses this as a proxy for cost reduction; this can cause savings to be understated
- The costs in the model are only for program implementation and do not include PFS transaction costs; this will increase the total cost of the program

Intervention costs

Intervention costs for asthma programs across the country vary on factors such as local pricing, type of home visiting model, clinic- vs. community-based components, and quality of housing stock. On average, asthma program budgets can range from \$4,000 to \$6,500 per enrolled client.

Given that the comprehensive asthma intervention has not yet been fully designed, the model pulls from GHHI’s reference class data to estimate a total program budget per person. We chose to utilize data from all six reference sites across the US instead of just focusing on Memphis, as it has inflated costs due to both the CHAMP model and the extremely poor conditions of the housing stock.

The budget utilized in the model is as follows:

Intervention budget, per enrollee in year 1

Cost categories	Intervention cost, USD	Need estimate, percent	Average intervention cost, USD
Tier I - Home Visiting Program	2,902	100%	2,902
Tier II - Environmental Intervention	4,741	60%	2,845
Average cost of program, per enrollee in year 1			5,746

Tier I services encompass all parts of the intervention related to the home visiting portion (e.g. CHW wages) and Tier II services include all aspects related to environmental remediation (e.g. mold removal). The need estimate is the percentage of homes expected to need Tier I and Tier II services, as not all homes will require physical home remediation. The average cost, therefore, is the total cost per person for the intervention: \$5,746.

Once the program has more concrete operational plans, including securing a home-visiting service provider, a Chattanooga-specific budget can be created. It is expected that TVA/EPB will provide funding for a portion of the Tier II services that overlap with their home energy upgrade and weatherization work. If this is the case, the budget will be less than what is currently in the model.

Draft pilot budget

A draft pilot budget has also been created, which will be updated as the project works more closely with operational partners to understand services and costs. Assuming a 20-home pilot with 10 needing more extensive home remediation (tier II), the draft pilot budget summary is as follows:

Personnel

	Per client, \$	Total, \$
Wages	1079.95	21,598.90
Fringe	0	0.00
		21,598.90

Intervention services

	Per client, \$	Total, \$
Project services		
Tier I Services	307.08	6,141.56
Tier II Services	2,490.20	24,902.00
		31,043.56

Other costs

	Per client, \$	Total, \$
Travel	81	1,620.00
Supplies	600	12,000.00
		13,620.00

Total

	Per client, \$	Total, \$
Project budget	3,313.12	66,262.46
Leveraged services		74,190.00

The leveraged services refer to the potential services provided by TVA/EPB's home energy upgrade program. Without those funds, the project budget would increase to cover some of the tier II services that TVA/EPB's program provides.

Additional intervention benefits

The model analyzes the benefits of the intervention in terms of reduction in hospital and emergency department utilization, but there are many other positive outcomes associated with a reduction in asthma symptoms and severity that the project could consider, including:

- Reduction in missed school days due to asthma (children)
- Reduction in missed work days due to asthma (adults)
- Increase in usage of controller medications
- Improvement in Asthma Control Test (ACT) scores

While these measures will not be tied to health care reimbursement, the program could still measure them to understand the impact and potentially utilize for other funding sources.

The next steps will be to understand what the project partners are interested in measuring and deciding the best way to collect the data.

Payer Engagement

Tennessee Medicaid

TennCare is the statewide Medicaid program that provides health insurance to children, individuals with a disability, parents or caretakers of a minor, and low-income pregnant women. Tennessee has not expanded Medicaid to low-income adults. The Children’s Health Insurance Program (CHIP) in Tennessee is called CoverKids. To be eligible, participants must not be eligible for TennCare and must be under 19 years of age or pregnant. As of January 2018, 1,552,073 have been enrolled in Medicaid and CHIP in Tennessee.⁵

Tennessee has not expanded Medicaid coverage to adults. The only adults currently covered by Medicaid in the state are pregnant women, parents and caretaker relatives, individuals with a disability, individuals in need of a level of care traditionally provided in a nursing home. These adults must meet income eligibility requirements. If the project is interested in working with adults that do not fall into any of these categories, we will explore working with health plans that offer commercial insurance.

The income eligibility limits for TennCare and CoverKids are as follows (as of June 1, 2016)⁶:

Children	Eligibility Level	Pregnant Women	Eligibility Level	Adults (Medicaid)	Eligibility Level
Medicaid Ages 0-1 ²	195%	Medicaid	195%	Parent/Caretaker ⁵	103%(\$)
Medicaid Ages 1-5 ²	142%	CHIP ⁴	N/A	Expansion to Adults	No
Medicaid Ages 6-18 ²	133%				
Separate CHIP ³	250%				

⁵ <https://www.medicaid.gov/medicaid/by-state/stateprofile.html?state=tennessee>

⁶ Ibid.

Medicaid Managed Care overview

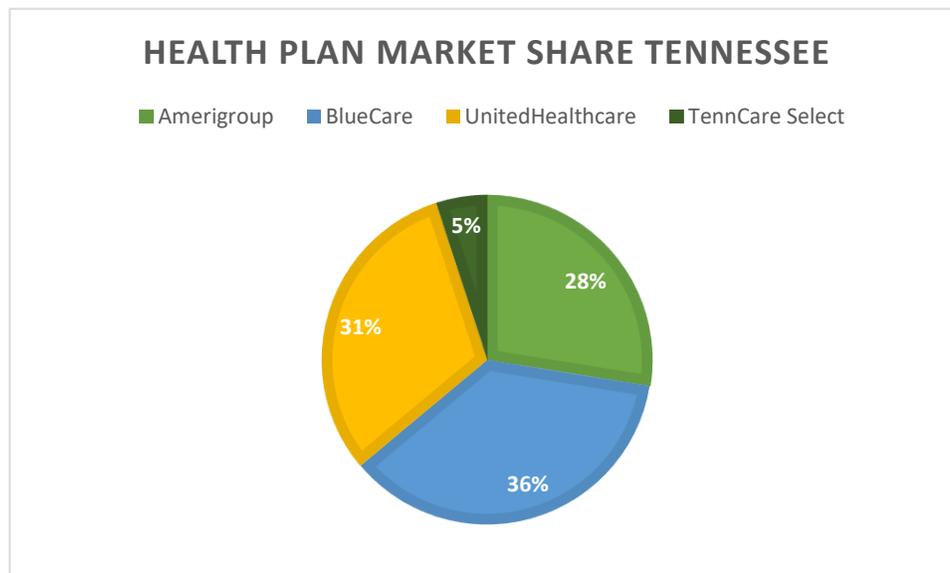
There are three Medicaid Managed Care Organizations (MCOs) in Tennessee that provide coverage to the state's TennCare and CoverKids members: Amerigroup, Blue Cross Blue Shield of Tennessee (BCBST), and UnitedHealthcare. BCBS has two programs for TennCare participants: BlueCare and TennCare Select.

TennCare Select is for two specific groups:

- **TennCare Select Community:** potential option for coverage for TennCare members that get services from the Department of Intellectual and Developmental Disabilities
- **TennCare Select Children:** Provides coverage for children and teens in state custody that are being cared for by Resource Parents

MCO market share

As of March 2018, the market share for the Tennessee MCOs is as follows⁷:

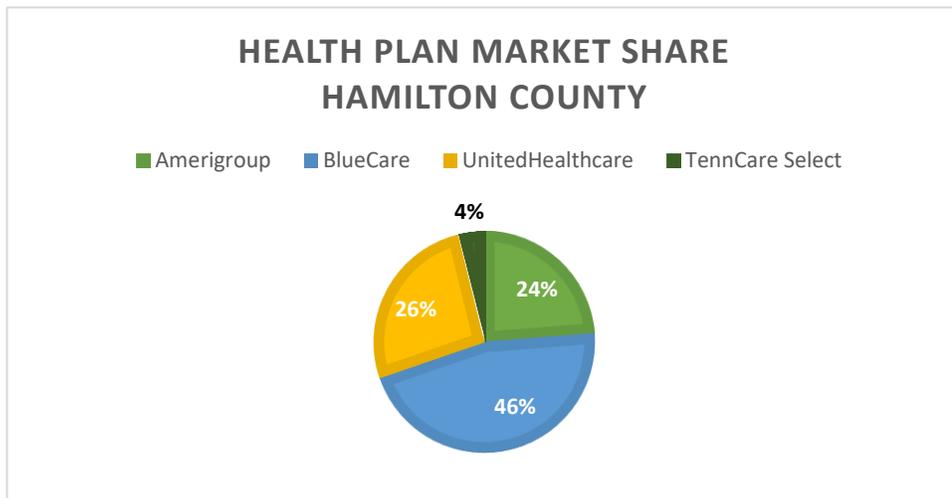


⁷ <https://www.tn.gov/tenncare/information-statistics/enrollment-data.html>

	East	Middle	West	General	Totals	Market share
Amerigroup				398,205	398,205	28%
BlueCare	213,344	165,837	147,135		526,316	36%
UnitedHealthcare	155,211	168,524	126,024		449,759	31%
TennCare Select				72,198	72,198	5%
PACE				283	283	0%
Awaiting assignment				38	38	0%
Totals	368,555	334,361	273,159	398,526	1,446,799	100%

TennCare considers Hamilton County, home to Chattanooga, part of East Tennessee. Statewide, BCBS is the largest MCO with 41% of the market share between its two plans (BlueCare and TennCare Select). Note that Program for All-Inclusive Care for the Elderly (PACE) has less than 0% market share and is not relevant for this project.

More specifically in Hamilton County, BCBS has a total of 50% of the market share between its two plans, with Amerigroup and UnitedHealth at 26% and 24% respectively.



Episodes of Care⁸

TennCare requires participation in payment and delivery system reform in its health insurance contracts. There are three strategies for reform:

- Primary Care Transformation (care coordination)

⁸ <https://www.tn.gov/tenncare/health-care-innovation/episodes-of-care.html>

- Long-term Services & Supports (LTSS)
- Episodes of Care

The last, Episodes of Care (EOC), are important to understand for the purposes of this project. EOCs focus on health care delivered in association with acute healthcare events. Episode-based payments seek to align incentives with achieving desired patient outcome. By 2020, Tennessee plans to design 75 EOCs. The EOCs are retrospective, which means that procedures and services included in the episode have already occurred. Each EOC has trigger criteria, but services can include pre- and post-care related to the episode that occur within the specified window. Services can be from multiple providers.

Each EOC is assigned a Principle Accountable Provider (PAP), commonly referred to as a quarterback. They are the person, group of people, or facility in the best to influence quality and cost of care and they are held accountable for the EOC. PAPs receive data on EOC quarterly that allows them to understand how they are performing and adjust before the performance period closes.

Asthma Acute Exacerbation Episodes were one of the first EOCs to be designed in Tennessee. The trigger criteria for this EOC are an ED visit, observation stay, and/or inpatient stay with a primary focus to treat acute symptoms attributable to asthma exacerbation. The window of care for the EOC is from the trigger event to 30 days after discharge for the trigger event. Post-trigger, asthma-related drug therapy, follow-up care (including home health visits), and repeat exacerbations that result in further hospital treatment that occur within the 30-day window are included in the episode. There are no pre-trigger inclusions. The PAP is the hospital where the trigger event occurred.

The Asthma Acute Exacerbation EOC is important to this project because all three MCOs must participate in providing data to and paying providers based on their performance during the 30-day EOC window for asthma patients. We have spoken with the MCOs about the Asthma Acute Exacerbation EOC and the feedback thus far has been that this will not interfere with the project. We plan to continue this conversation.

Tennessee commercial insurance market

Given that the project may want to serve adults and Tennessee has not expanded Medicaid to all adults, there may be interest in speaking with health plans that provide commercial insurance. Of the three health plans that provide Medicaid in Tennessee (Amerigroup, United, and BCBST), UnitedHealth and BCBST are also in the commercial market. Currently, GHHI does not see any barriers to creating an arrangement with the health plans that cover both Medicaid and Commercial members.

Potential payment mechanisms

There are multiple payment mechanism options to consider in Chattanooga, including value-based purchasing, pay for success, and fee for service. A combination of two or more of these mechanisms could also be explored.

Given conversations with MCOs in Tennessee as well as with Erlanger Children's Hospital and other Chattanooga partners, we believe the most viable payment mechanism for the Chattanooga project is value-based purchasing utilizing pay for success financing to reduce the risk of the service providers. This is the payment mechanism that is being utilized in the Memphis project GHHI is undertaking to secure reimbursement for Le Bonheur Hospital's CHAMP program and has the interest of at least two of the three MCOs in Tennessee.

Value-based purchasing agreements

In Tennessee, as in many other states, the government has contracted with Medicaid Managed Care Organizations (MCO) to provide insurance coverage to Medicaid members. The government pays the MCOs a capitation rate, which is a fixed dollar amount per member per month to cover a defined set of services. In turn, MCOs charge a negotiated rate or fee for service to health care providers that serve the plan's enrollees.

The capitation rates the MCOs receive is recalculated each year based on past spending. Given this, MCOs are not incentivized to invest in preventive services such as the comprehensive asthma intervention because they will receive a lower capitation rate and the

government will retain the savings associated with the preventive service. Value-based agreements are a way to mitigate this.

In a value-based purchasing agreement, MCOs make payments to providers based on value instead of volume. For example, if the comprehensive asthma intervention reduces the total cost of care for asthmatics, therefore saving the MCO money, the MCO will share those savings with the provider. If a value-based purchasing agreement is in place, the MCO can report those savings payments for inclusion in the next years capitation rate, allowing them to capture the savings. While the value-based contract must be between one or more MCOs and a Medicaid provider such as Erlanger Children's Hospital, the Medicaid provider can subcontract out to non-Medicaid service providers such as LifeSpring.

In Memphis, GHHI is working with all three MCOs to put a value-based contract in place.

Pay for success financing

Pay for success (PFS) financing is not itself a source of health care reimbursement, but it can be used in conjunction with value-based purchasing or other reimbursement mechanisms. It serves two main purposes: bridging the cash gap that occurs when switching from paying for volume to paying for value and mitigating service provider risk.

PFS financing brings in external investors (e.g. banks, Foundations) to provide the up-front capital for the comprehensive asthma intervention to scale and operate until results can be evaluated and shared savings paid. As the MCO will not realize a reduction in cost of care for asthmatic patients due to the intervention until at least one year after services are provided, funding is needed to cover the costs for that initial service delivery period.

Once savings have been realized, the MCO will pay the service provider in accordance with the reimbursement agreement and the provider will use those funds to repay PFS investors. This arrangement allows the service provider to shift performance risk to the external investors. If the comprehensive asthma intervention does not have the intended outcomes and the MCO does not realize savings, the investors do not need to be repaid.

This risk-shift is not free. In addition to paying back principal, investors will also receive a return on their investment depending on how well the intervention performs. Different investors have various motivations for investing in this type of project, but often they are mission-driven impact investors that require a lower than market rate return.

Fee for service

Fee for service (FFS) is a standard health care payment mechanism often used by MCOs to pay providers for covered services they deliver to members. Covered services are determined through contracts (e.g. office visits, tests). Much of the comprehensive asthma intervention would not be considered a traditional covered service, but in Memphis Le Bonheur and BlueCross Blue Shield (BCBS) have negotiated an agreement for asthma home visits to be covered on a fee for service basis at \$70 per visit. It is possible that BCBS would be interested in the same agreement in Chattanooga.

It is important to note that BCBS has decided to suspend conversations about entering into a value-based agreement with Le Bonheur until the fee for service arrangement is in place and tested. The other MCOs continue to remain interested in value-based purchasing.

Potential funders and funding sources

green|spaces has had conversations with potential funders, including the Community Foundation of Greater Chattanooga and the BCBS Foundation of Tennessee, about funding a potential pilot. These conversations will be continued in the coming months as the project plans to present the findings of the initial feasibility study.

Opportunities and Challenges

Strengths, weaknesses, opportunities, and threats analysis

A SWOT analysis will allow the project to think through the strengths, weaknesses, opportunities, and threats that exist and what next steps are necessary given the findings.

Strengths

- Diverse group of dedicated partners willing to put time and effort towards building an evidence-based program to reduce asthma severity for people in Chattanooga
- Strong partnership with healthcare provider (Erlanger Children's Hospital) that could potentially serve as the contract holder for a value-based purchasing agreement with a Managed Care Organization (MCO)
- Strong community organizations interested in participating to build out the comprehensive asthma program; specifically the interest of LifeSpring, a practiced community health organization with experience home visiting with CHWs
- Interest from EPB and TVA to provide some of the tier II services that overlap with the Home Energy Upgrade and weatherization programs to program participants, bringing in the expertise of these organizations and lowering program costs
- Initial conversations between green|spaces and local investors have revealed interest in funding a pay for success project

Weaknesses

- There has been no commitment by Erlanger to serve as the primary contractor for the value-based purchasing agreement; it is possible that a project could move forward without this commitment, but another Medicaid provider would need to be identified to hold this position
- The potential project partners have not all worked together and have never implemented a comprehensive asthma intervention; thorough operations planning and a pilot can help to mitigate

- The data set we had access to for the cost-benefit analysis is limited and incomplete; further analysis of health plan claims data will allow for a more robust analysis

Opportunities

- A few of the Tennessee MCOs have expressed interest in a similar project in Memphis, which is much further along; Chattanooga could take advantage of this momentum and the processes being developed in Memphis (e.g. standard contract)
- Based on the stakeholder analysis, there are no similar interventions in the Chattanooga area, meaning there is a great need for this type of program
- New programs in the community, including EPB's Home Energy Upgrade and the City of Chattanooga's new Healthy Homes funding, are ideal partnerships for the program and can pay for some of the home assessment/remediation services in some homes, reducing the program costs

Threats

- As outlined above, Tennessee has implemented mandatory Episodes of Care (EOC), one of which is for asthma; while value-based agreements could be put in place alongside EOC, the administrative burden of EOC may cause health plans to shy away from further shared-savings agreements

Conclusion and Next Steps

Conclusion

GHHI has determined that a comprehensive asthma intervention in Chattanooga is both highly needed and feasible and recommends moving forward with a pilot to allow LifeSpring, EPB, TVA, and green|spaces to work together to build an operations plan and test some of the assumptions in the cost-benefit analysis.

While the project is in the very early stages, the findings of the initial feasibility study indicate that there are dedicated partners from the health and energy sectors, a demonstrated need based on the public data, and a potential return on investment for providing these services to high-utilizers.

Upon review of these findings, the Chattanooga team has decided to move forward with securing funding for a pilot. Moving forward, project partners can utilize the pilot to train community health workers and energy auditors in asthma home visiting, create an operations plan and integrated budget, and gather claims data for a more robust economic analysis.

Next steps

The immediate next step for the project team is to review the information in this report and in the supplemental documents (stakeholder analysis, cost-benefit analysis, draft pilot budget) to determine the best way forward for the pilot.

Once the team secures funding to design and implement a pilot, GHHI recommends the following next steps:

- Meet with Erlanger leadership team to determine if they are interested in further exploring playing the role of primary contractor on the value-based agreement
- Engage health plans to gain access to claims data for further analysis
- Bring together the proposed project partners to gain official buy-in for participation in the project and begin operations planning for the pilot

- Convene potential funders to give them a primer on the project and the potential pay for success financing mechanism
- Train community health workers and energy auditors in asthma home visiting and environmental trigger remediation