

## EXECUTIVE SUMMARY

Social Determinants of Health (SDoH)—including employment, the availability of food, stable housing, transportation, and access to health care—significantly drive health outcomes, accounting for up to 80% of an individual’s health. This is due largely to systemic social and institutional barriers that prevent residents from attaining the resources they need to be healthy and productive members of society. The COVID-19 pandemic has further exacerbated issues related to SDoH. People with unmet social needs are at risk for chronic diseases, which make them particularly susceptible to the life-threatening complications of the virus. Current services and information systems exist in a fragmented manner, making it difficult for families to meet their social needs and for providers to deliver seamless care.

The Greater Houston Coalition for Social Determinants of Health (the Coalition), which is led by UTHealth, American Heart Association, and Harris County Public Health, includes more than 100 organizations with a singular mission of establishing a sustainable, data-driven, human-centered ecosystem of care that equitably addresses SDoH among residents of the Greater Houston area. As first step towards achieving this mission, we propose to build a cloud-based **Community Information Exchange (CIE)** linking various local community-based organizations (e.g., Houston Food Bank, United Way, and others) to facilitate care navigation for social services in the Greater Houston area. The CIE will use a **federated model** such that it is the framework that will allow multiple organizations (healthcare and CBOs) with varied technologies to connect with one another for the purpose of coordinating care to meet social needs. The project will be led by UTHealth on behalf of the Coalition. This effort will be guided by the Coalition’s principles to meet the goals outlined in the February 19<sup>th</sup> draft charter<sup>1</sup> of the Coalition. As part of our 18-month project, **we will partner with key community-based organizations (CBOs), healthcare organizations, and technology vendors in our community**, and use a phased approach to:

1. **Develop and implement a resource data infrastructure** to bring disparate sources of data together to create a searchable directory of Community-Based Organizations and social agencies to help address SDoH.
2. **Develop and implement the referral network infrastructures** to support referrals between social services organizations, track impact of referrals on client social needs and behavioral outcomes.
3. **Develop the vendor agnostic infrastructure to link the CIE to healthcare organizations** to facilitate care coordination between healthcare and social services, and implement using a phased approach. This will allow us to track the impact of these investments on patient health outcomes.
4. **Develop an adoption and sustainability model** for implementation, broader adoption and maintenance of the CIE infrastructure beyond the 18-month project development period. We will also develop a series of recommended policy and practice actions and engage payers, state- and local-level policymakers that can lead to sustainability and further adoption of the CIE in the Greater Houston area.

On behalf of UTHealth, the Coalition, and the communities you have improved, we are grateful for your support. Your philanthropic investment will continue to benefit the health of our community for generations to come. The total project costs are estimated to be \_\_\_\_\_. UTHealth has committed to contribute \$250,000 to this project, and at this time, we respectfully request the {name of funder} Foundation's consideration of a \_\_\_\_\_ commitment to develop the CIE over 18 months to improve the health of our most vulnerable populations in Houston and beyond. We will continue to share and gain insights with partners across the state undertaking similar efforts. Upon completion, this project will be scalable across Texas, aligning with the foundation's goal to build an equitable, accessible health system for every Texan.

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<sup>1</sup> Agreed upon by the attending health and social services organization executives as well as executives from other attending community partners on February 19<sup>th</sup>

## **THE PROBLEM**

Over \$3.6 trillion is spent annually on health care in the United States, yet health outcomes are below most developed nations. The United States is ranked 28th in life expectancy and 33rd in infant mortality out of 36 nations in the Organization for Economic Cooperation and Development. Up to eighty percent of an individual's health is attributed to SDoH—social, economic, and environmental factors—while a mere 20% is influenced by medical factors. This is largely due to systemic social and institutional barriers that prevent residents from attaining the resources they need to be healthy and productive members of society. These factors may include unstable housing and employment, low access to healthy foods, lack of accessible public transportation, lack of insurance, unaffordable prescription drug costs and more. Despite this, the United States is the only major country to spend more on medical care than social care. Clearly, there is a disparity between health care resource distribution and efficacy, and with no mechanism to connect these sectors of the health care system, real change is unlikely to happen. Furthermore, because all agencies keep their own private records, there is no current mechanism or infrastructure to help view the full landscape of how a community at large utilizes its resources. With a system that misaligns resources to its community's needs, no or low capacity to measure the impact of community investments, and no venue to analyze actionable community data, the health care industry is stuck in the status quo.

The COVID 19 pandemic has further exacerbated the issues of unemployment, food insecurity, housing insecurity, lack of access to health care, and other SDoH in our communities. Preliminary data suggests a 20% increase in food insecurity among low-income Houstonians. The impact of this will unfortunately last for years to come. Now more than ever, we need a strong, nimble, and human-centric technology-based information exchange infrastructure to meet the needs of individuals in the community where they are. A robust Community Information Exchange (CIE) could allow for coordination of care for multiple social needs of an individual at any given time. Targeted efforts to meet the needs of the most vulnerable could be deployed strategically and rapidly. Further, community-based organizations (CBOs) could learn, strategize, and align to better meet the needs of the community, and this data could be used to promote advocacy efforts on behalf of our community members. We believe the time for action to build this information exchange infrastructure is now.

## **A COMPREHENSIVE MODEL**

### **Greater Houston Coalition on Social Determinants of Health**

Greater Houston Coalition on Social Determinants of Health (the Coalition) consists of over 100 organizations across the Greater Houston area spanning the health care, non-profit, for-profit, government, academic, other regional coalitions, and philanthropic sectors, but operates primarily in Harris County. Using a collective impact framework, the Coalition is uniquely poised to create systemic change to improve health outcomes by addressing SDoH. The Coalition is led by three backbone organizations: UTHealth School of Public Health, American Heart Association, and Harris County Public Health. The Coalition's vision is a future in which the Greater Houston community fosters health equity for all of its residents, and its mission is to establish a sustainable, data-driven, human-centered data exchange ecosystem of care that equitably addresses the SDoH among residents of the Greater Houston area. Food security is the initial priority metric for success of this data-driven, ecosystem approach. To that end, over the past 18 months, the Coalition backbone organizations have conducted extensive community and organizational engagement, deployed seven active workgroups, formed an Executive Ambassadors advisory group, and established a Steering Committee to guide the Coalition's activities and operationalize the vision into action.

The Coalition's well-defined structure consists of the aforementioned seven workgroups: 1) SDoH Framework and Common Metrics, 2) Food Insecurity, 3) Data-Sharing Ecosystem, 4) Policy, 5) Communications, 6) Coalitions Alignment, and 7) Community Voice. The workgroups, which are made up of partner organizations from across the Coalition, have defined goals and objectives and monthly meetings to achieve their respective milestones. The Steering Committee, consisting of the backbone leads and workgroup co-chairs, coordinates activities across the workgroups, and provides strategic support to the mission of the Coalition. Finally, the Executive

Ambassadors, consisting of the leadership of the three backbone organizations, provides the strategic input and vision, internally and externally to the work of the Coalition. See figure 1 for Coalition structure.

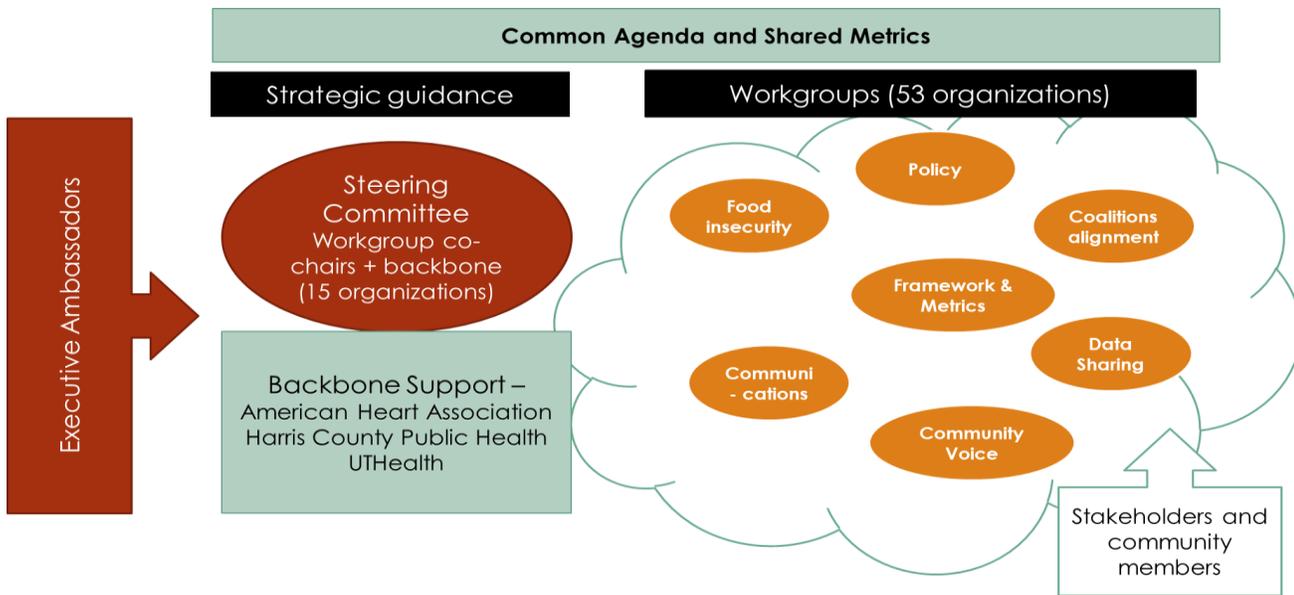


Figure 1: Structure of the Greater Houston Coalition on Social Determinants of Health

To put the Coalition’s vision into action, a consensus was reached by Coalition members and the Steering Committee to pursue our proposed project: **the development of a data exchange ecosystem starting with a CIE infrastructure, and connecting the CIE to healthcare partners. We will partner with community-based organizations, healthcare organizations, and technology vendors (PCIC, Welnity, United Way, Combined Arms, Greater Houston Healthconnect) to build upon and align existing technology efforts in our area.**

The CIE infrastructure will:

- (1) facilitate collaboration in care among CBOs.
- (2) enable coordination of care between CBOs and health care institutions.
- (3) enhance the ability to analyze and evaluate programmatic effectiveness and unmet needs.
- (4) establish accountability and good governance for all of the above by centering the perspectives and needs of providers and clients.
- (5) develop adoption and sustainability model for continuation of these efforts.

The project will be fiscally-led and managed by UTHealth on behalf of the Coalition.

## THE SPECIFIC AIMS OF OUR PROJECT ARE:

### AIM 1: DEVELOP AND IMPLEMENT A RESOURCE DATA INFRASTRUCTURE

Several resource lists and directories exist in the Greater Houston area, with different areas of focus, levels of accuracy, and detail. It ranges from print material (like the Houston Resource Guide, also called the Blue Book, connecting resources and services to people living with HIV), semi-structured electronic documents (like The

Spot 4 Help, which provides professionals with access to community resources and events) and structured datasets (like PCIC, Combined Arms, Welnity, and United Way 211). A key function of a CIE is to bring these disparate sources of data together through a common protocol to access, distribute, and share the resource data. Connecting these sources will be achieved through a federated model that uses interoperability standards like Open Referral. Using this framework, will achieve the following goals:

- A **federated** resource directory network that connects multiple directories.
- Up-to-date resource data that blends data across directories.
- An ecosystem to share and update resource information across directories.
- A framework for a community resource network that is scalable.

### KEY ACTIVITIES (SEE FIGURE 3)

- **Landscape analysis and identification of existing resource directories:** We will conduct a detailed landscape analysis of the community resource directories that are currently available for the Greater Houston area, including, their current mechanisms of maintenance and updates, area of focus, and data structure in use.
- **Development of partnerships with existing directories for a federated model:** We will identify key resource directory partners that need to be involved in integrating the resource directories through a common standard.
- **Development and selection of resource data standards:** For effective connection and interoperability between disparate resource directories, we will develop a common language and a set of rules for the data structure. Data standards, such as the Human Service Data Specification data exchange format from Open Referral, have been designed as specifications for resource directories and will be implemented across the different directories being integrated.
- **Development of resource application programming interface engine:** For effective communication between resource directories, a common protocol for transfer and access to directories needs to be in place. This is done through an application programming interface (API) using a well-recognized software architectural style called RESTful web services. A RESTful system design used in parallel with an open standards file format for data transfer like JavaScript Object Notation enables the creation of distributed, scalable, platform-independent web solutions. The API engine for a federated resource directory is built on this and provides the function to translate individual directory specific APIs to a generic API that is accessible by all systems that use the web service. The resource API engine also performs core functions, that include:
  - a. algorithmically matching resources across different directories (identifying duplicates),
  - b. aggregating information for a single resource record across directories,
  - c. identifying confidence levels and accuracy of resource data, and
  - d. syncing data (create, update, delete actions) across directories so that resource information always stays up to date.
- **Development of a Master Resource Index:** A part of the Resource Data Infrastructure is a Master Resource Index (which functions very much like a Master Patient Index) with a focus on matching resources across directories on an ongoing basis, as a backend service. This enables for unique identification of a resource when searching across multiple directories and helps accelerate search algorithms while improves accuracy through a dual mode for retrieving search results using both natural language processing algorithms as well as pre-linked resource records.
- **Integration of Resource API Engine into existing directory systems:** The Resource API Engine's functionality (generic web services endpoints) will be integrated into existing referral systems and resource directories. While the heavy lifting of core functions (identified in bullet point (d) above) are handled by the Resource API Engine, simplified web services endpoints are made available to partner systems to integrate into the federated resource network.

## **AIM 2: DEVELOP AND IMPLEMENT A REFERRAL NETWORK INFRASTRUCTURE WITHIN COMMUNITY-BASED ORGANIZATIONS.**

The Referral Network Infrastructure is designed as a separate component, while still capable of integrating with the Resource Data Infrastructure. This is important to enable the segregation of the two types of data: one that includes personally identifiable information and/or protected health information and comes under specific regulatory compliance and resource data that does not. This design also supports the standalone access to the resource infrastructure and the integration of directory solutions into the CIE that do not support the transfer of personally identifiable information or protected health information.

The Referral Network Infrastructure design supports a distributed model and expands referral networks by supporting integration between one referral platform to another. This can help increase dedicated bi-directional referrals by expanding the overall network that is available to a sender. This framework will achieve the following goals:

- The Referral Network Infrastructure will provide for effective bi-directional referrals from core health systems (e.g. UTHealth, Harris Health System, MD Anderson Cancer Center, and Memorial Hermann Health System) and CBOs in conjunction with the Resource Data Infrastructure identified above.
- Provide a platform agnostic technology framework for referrals, using standardized web services that can easily integrated into existing vendor solutions for care coordination.
- Connect existing technologies operating and coordinating care in the Harris County region for the proof-of-concept, to be further expanded in the Greater Houston area.
- Support technology integrations for care coordination.
- Support bi-directional feedback loops to effectively communicate between referral sender, referral receiver, and the client.
- Support the development of dedicated pathways and identification of primary contacts between sender and receiver of referrals for improved accountability and successful close-loop referrals.

### **KEY ACTIVITIES (SEE FIGURE 3)**

- **Increased community engagement:** We will work with and engage community partners to expand and refine the referral network specific to the initial scope of work of the Referral Network Infrastructure.
- **Development of referral pathways:** Development and mapping of “in-network” referral pathways between CBO partner systems is vital for a successful referral network. While referral systems may have many resources to select from, it does not result in close-looped referrals with a one-size-fits-all model. We will establish accountability, understanding of agency specific workflows, and well-established communication protocols between partners involved in the referral network for the development of a successful and scalable referral network.
- **Development of Referral API Engine:** Very much like the Resource API Engine, the Referral API Engine plays a critical role and is responsible for translating individual platform-specific referral APIs to a generic API that is accessible by all systems that use the CIE web service. The Referral API Engine will be built using RESTful web services and will enable secure data transfer through JavaScript Object Notation. In addition to supporting interoperability between referral platforms, the API engine will expand a specific platforms referral network by adding referral networks from other participating platforms into the ecosystem.
- **Integration of standards:** We will integrate standards for interoperability like Fast Healthcare Interoperability Resources, Health Level Seven, and SDoH core data standards from national efforts like the Gravity Project to enable for faster interoperability with health care systems. Since PCIC, Welnity,

and many of the technology vendors in the Coalition are part of the Gravity Project, these updates will be integrated as they evolve.

- **Integration of Referral API Engine into existing referral systems:** The different partner systems (i.e. CBOs) will integrate the Referral API Engine into their existing individual referral systems.
- **Client self-access:** In addition to a provider-facing portal, we will also develop a client self-access portal. A client self-access portal provides a secure, authenticated, public interface that enables clients and patients to interact with the CIE, navigate their own care and access to resources, to understand their data rights, and to provide ownership of appropriate data in the hands of the client. This enables a systemic change in the current model where the locus of control shifts to the client. It also provides a mechanism for collecting client-facing qualitative assessments to study the impact and function of a CIE directly on the client.

### **AIM 3: DEVELOP A VENDOR AGNOSTIC BI-DIRECTIONAL CLIENT/PATIENT REFERRAL BETWEEN CBOs AND HEALTHCARE ORGANIZATIONS**

This client/patient referral and data infrastructure achieves the following goals:

- Expanding on aim 2 to develop a vendor agnostic bi-directional client/patient referral between CBOs and healthcare organizations to foster a subsequent phased implementation.
- Establish a data-informed understanding of population and individual SDoH needs.
- Foster an understanding of health outcomes across sectors (e.g. healthcare and CBOs).
- Create and connect infrastructure for community-level population health analysis and program development.

### **KEY ACTIVITIES**

- **CIE-Healthcare organization and HIE linkages:** A Health Information Exchange (HIE) supports the exchange of information across the health care provider community. Greater Houston Healthconnect is the operating HIE for the greater Houston area, and an active member of the Coalition. Integrating the HIE and CIE will provide an expanded data infrastructure to support the sharing of appropriate information from social service providers and health care providers and vice versa. HIEs usually run on a health care informatics platform (e.g., HealthShare from InterSystems), that usually support standard healthcare interoperability standards like Fast Healthcare Interoperability Resources and Health Level Seven, that can be used for integrating with the CIE.

### **AIM 4: DEVELOP AN ADOPTION AND SUSTAINABILITY MODEL FOR IMPLEMENTATION, BROADER ADOPTION AND MAINTENANCE OF THE CIE INFRASTRUCTURE BEYOND THE 18-MONTH PROJECT DEVELOPMENT PERIOD.**

We will also develop a series of recommended policy and practice actions and engage payers, state- and local-level policymakers that can lead to sustainability and further adoption of the CIE in the Greater Houston area. As part of this project, we will leverage the Coalition infrastructure and stakeholder engagement to conduct the following tasks:

- Facilitate the implementation of the phased broader adoption, linkage and utilization of the CIE by healthcare organizations, and CBOs.
- Host a series of meetings with Coalition members, including policy makers, health care payers to share findings and generate collective action to establish long-term sustainability for the CIE-HIE ecosystem based on these findings.
- Develop a series of recommended policy actions based on the findings and information from the proposed meetings with payers.
- Vet and anchor policy actions with our Coalition Policy Workgroup.

- Work within our Coalition networks and infrastructure to engage payers and state and local policymakers in policy actions that can lead to dissemination and further adoption of the CIE infrastructure, and build a model for sustainability beyond the project timeframe.

**PROJECT OUTCOMES:** We will facilitate standardized outcomes tracking at the individual, agency, and community levels. This will consist of:

- Tracking patient/client-facing quantitative outcomes (social needs, behavioral, and health outcomes and related disparities)
- Tracking client-facing qualitative outcomes
- Tracking of root causes of SDOH risks in the community
- Standardizing key referral metrics (quantitative and qualitative) across partner agencies
- Tracking process metrics to identify successes and barriers in the referral process
- Enabling a standard reporting mechanism across partner agencies

Our theory of change for the CIE grounded in the Social Ecological Model will guide the evaluation framework for this work:

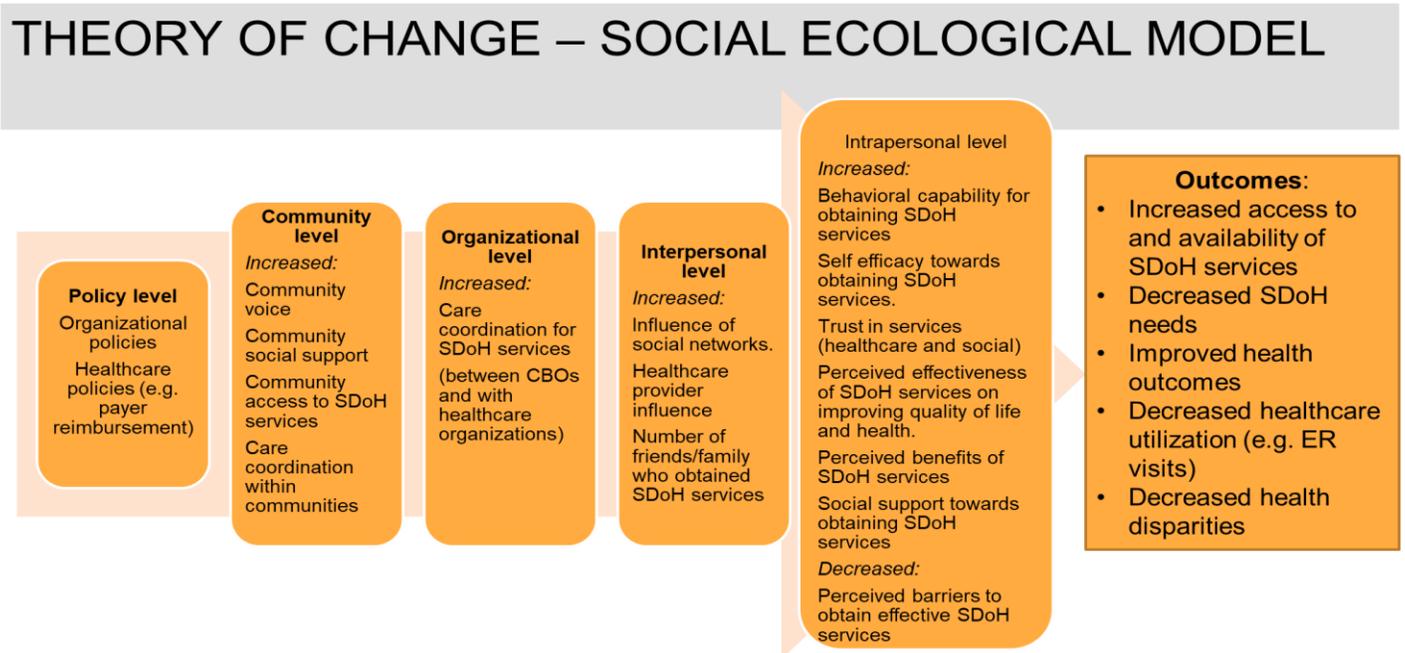


Figure 2: Theory of change for the information exchange ecosystem

## CONCLUSION

This project builds upon and operationalizes the vision of the Coalition to develop a healthy data exchange ecosystem starting with a CIE infrastructure in the Greater Houston area. This project is unique because the CIE will be developed based on the needs of the community, taking community input and focuses on food insecurity as a priority SDOH. The connectivity and interoperability functions are vendor agnostic, which will support effective partnerships for care coordination and referral in the community. Our focus is on the framework or scaffolding needed for a robust CIE, and it provides the foundation for future collaborative initiatives.

As a broader study of this project, we will understand:

- The direct impact of a CIE on SDOH in the community. Furthermore, the CIE solution will be built with the community as opposed to a top-down, pre-determined solution from the technology vendor.
- Quantitative and qualitative outcomes of a collaborative model for resource and referral management.

- The impact of a CIE infrastructure on the improved response to community disasters.
- Improvements in the referral workflow within CBOs, and between healthcare providers and CBOs.

**FIGURE 3: SCHEMATIC OF THE COMMUNITY INFORMATION EXCHANGE**

