

HEALTH EQUITY DATA ANALYTICS USER STORIES | 2019

HEALTH
EQUITY
SOLUTIONS



DataHaven
The Twenty Fifth Year



**Equity Research and
Innovation Center**
Yale School of Medicine

INTRODUCTION

User stories originated from agile development, a collaborative process to develop requirements for systems and co-create software and other products. They describe essential information related to work activities of specific end users. The standard format follows, “As a (type of user), I want (to achieve a certain goal), so that (some reason/value)”.¹

The Health Equity Data Analytics (HEDA) team was tasked with addressing and embedding health equity within Connecticut’s statewide Health Information Exchange (HIE), known as the Health Information Alliance (HIA), and its supporting data architecture, the Core Data Analytics Solution (CDAS), responsible for extracting, processing, synthesizing, and visualizing healthcare data. To support the incorporation of health equity data elements into this data architecture, the HEDA team created a series of health equity user stories that help to establish an initial foundation for designing analytic capabilities that respond to the needs of key end users working across various sectors to advance the health and well-being of all Connecticut residents.

¹ Cohn, M. (2010). Succeeding with agile: software development using Scrum. Pearson Education.

KEY END USERS OF HEALTH EQUITY DATA

Health Systems

Currently, Connecticut health systems have some capacity to collect various health equity data elements from their electronic health records (EHRs) and claims data, though the types and quality of data being captured and analyzed varies widely.

Connecticut's HIA will provide additional analytic capacity to assist health systems in measuring their investments in interventions that address social determinants of health, such as chronic disease management in neighborhood health clinics and the associated impacts on claims. A standardized means of collecting and analyzing health equity data elements will also provide health systems with a more comprehensive understanding of their patient population, which can inform resource allocation and provide opportunities to enhance and evaluate cost-effectiveness.

Providers

Providers need relevant, timely, accurate, and complete information to make patient-centered clinical decisions rooted in an understanding of patients' context beyond the clinical setting. This includes the social and structural determinants of health that historically and currently have prevented people of all backgrounds from achieving their full health potential and have created inequities in patients' risk of disease, their ability to optimize their health, and overall health outcomes.

When fully functional, the HIA will obtain information from a variety of data sources, including state and jurisdictional health departments and HIA participant data. This information will be displayed to providers accessing HIA services.

With a constant flow of information from various entities in the healthcare enterprise (e.g. home care providers, pharmacies, therapists, etc.), providers will benefit from a central source of information that synthesizes accurate, context-specific information in a timely manner. This accessible information can help providers more effectively connect patients to tailored support services that may greatly improve their health outcomes.

Policymakers and State Officials

The HIA will support policymakers and state officials who need independent, reliable and objective data to be able to refine Connecticut's health priorities and inform effective policy change. The health equity data elements collected and integrated within the HIA will enable standard and precise public health surveillance across different health systems and geographies. Decision makers will have access to enhanced, granular population-level data and analytics on health outcomes, demographics, and the quality, accessibility and cost of

healthcare delivery, which, together, will provide evidence to support policies and promising practices that advance health equity.

Community-Based Organizations

For community-based and municipal agencies, non-profits, and philanthropies seeking to promote and improve local population health and health equity, Connecticut's HIA can provide specialized, hyper-local information that can be utilized both in support of advocacy efforts and as a tool to aid in the development, funding, and monitoring of robust community-based health and social service programs that are accountable for meeting delineated health improvement priorities and other common objectives, including equity-informed delivery of services.

Note—these categories of end users do not encompass all stakeholders that may utilize or find value in the HIA (e.g. public health practitioners, patients/caregivers, etc.), however, we have chosen to highlight the four aforementioned end users (health systems, providers, policymakers, and community-based organizations) as they may be most likely to interact with the HIA while it is still in its early stages of development.

USE CASES

All Payer Claims Database (APCD) Analytics

Topline Story

The Connecticut All Payer Claims Database (APCD) was established in 2012 for the purpose of collecting, assessing and reporting healthcare information relating to safety, quality, cost-effectiveness, access, and efficiency for all levels of healthcare.² The APCD contains information on:

- Patients
- Providers
- Insurance types
- Care events (e.g. admission to discharge)
- Cost of care (e.g. who is billed, how much, out of pocket expense for patient)
- Medications

As a central repository for massive amounts of health care-related data, the APCD is an essential data resource for the HIA. The APCD provides an opportunity to increase the availability of data to all stakeholders, including providers, healthcare systems, policymakers, and community-based organizations to improve access, quality, equity, and cost of care. Linking Connecticut's APCD with other data resources will enhance our ability to improve health equity in Connecticut.

User Stories

A	Identifying patient needs and facilitating linkages to clinical and community programs
A1	Providers want to know if their patients are facing instability (e.g. housing, insurance, food insecurity, etc.) at the point of care to better understand factors impacting a patient's health and well-being.

² <http://www.cga.ct.gov/2012/ACT/Pa/pdf/2012PA-00166-R00HB-05038-PA.pdf>

Value	<ul style="list-style-type: none"> ● I want to receive an alert for instances of probable housing instability, for example, patients that have moved addresses multiple times within the past year. ● I want to be able to see a history of my patients housing situation. ● Geocoding of address can highlight instances when a patient has not reported homelessness, but is currently residing at an address that is a known shelter. ● Specific ICD-9 and ICD-10 social codes for housing and economic circumstances allow providers to see present or historic housing insecurity, which put the patient at a higher risk for future housing insecurity.
Additional data sources	<ul style="list-style-type: none"> ● Data collected from the Health-Related Social Needs Screening tool that is being used at sites participating in the Accountable Health Communities model through Center for Medicare and Medicaid services. ³
A2	<p>Health systems and community-based organizations want to identify individuals who could potentially benefit from enrollment in care management programs offered at hospitals or in the community.</p>
Value	<ul style="list-style-type: none"> ● I want a high-level ability to visualize various factors impacting health in a single place so that I can examine and present interrelationships within the data. ● I want to track admissions of patients Ambulatory Care Sensitive Conditions and to map proximity from a patient’s residence to the closest primary care clinic covered by their insurance. ● I want the ability to easily present graphics and visuals to a general audience. ● I want a more reliable ways to track data on individuals with a preventable ER admission. ● I want health outcomes filtered by neighborhood and disaggregated by race/ethnicity categories so I can easily see population disparities to better target outreach efforts. ● I want to examine the trajectory of individuals with social codes. I want to stratify based on disaggregated race/ethnicity and insurance status.

³ Billioux, A., K. Verlander, S. Anthony, and D. Alley. (2017). Standardized screening for health-related social needs in clinical settings: The accountable health communities screening tool. Discussion Paper, National Academy of Medicine, Washington, DC. <https://nam.edu/wp-content/uploads/2017/05/Standardized-Screening-for-Health-Related-Social-Needsin-Clinical-Settings.pdf>.

	<ul style="list-style-type: none"> ● I want to map geocoded residential addresses of individuals with social codes and filter by condition to identify census areas needing additional support. ● I want to map providers caring for vulnerable patients. ● I want to have capacity for bi-directional data entry, so that health and human service agencies are provided data in real time to assist them in identifying needs of vulnerable populations.
Additional data sources	<ul style="list-style-type: none"> ● Overlays of other social and geographic data. ● Linkages to related resources (e.g., statewide health equity reporting, vital statistics, advocacy resources).
B	Facilitating understanding of barriers faced by vulnerable communities to inform policy priorities and program aims
B1	State officials and policymakers need access to data related to health outcomes that can provide justification for policies supporting healthcare reform by advancing health equity.
Value	<ul style="list-style-type: none"> ● I want to examine all trends in care across vulnerable populations, with the ability to filter by disaggregated race/ethnicity, insurance status and geocoded residential address, and legislative district. ● I want to link medication data to prescription drug monitoring program (PDMP) to identify patients prescribed opioids who are at risk of under or over medication. ● I want to view medical conditions of individuals with a history of incarceration to track continuity of care during and after criminal justice involvement. ● I want to visualize transitions in insurance by type (Medicaid, Medicare, dual coverage, private) to identify populations at risk of insurance instability.

Alternatives

Currently, there is no standardized, high-quality, easily-accessible data source that collects social determinants of health (geocoded- residential addresses, race/ethnicity data, or insurance status) for providers or healthcare systems to use for either assessing social risk

at the point-of-care or at the population level. This limits the ability of providers to make changes to care-management and practice-management plans that better address these social risks.

There is no data source that easily tracks insurance status across the lifespan to help understand how changes, even micro changes, in one's insurance status can influence health outcomes, quality, and cost.

To be meaningful, this data needs to be integrated with other health and health-related databases.

Dependencies

1. **Ability to maintain data quality:** Ensuring consistency of the data collected within the APCD is essential to maintaining the integrity of the analytics. This includes improving quality assurance procedures for flagging and reconciling missing data.
2. **Provider willingness to use ICD-9 and ICD-10 codes:** Research demonstrates that providers inconsistently use International Statistical Classification of Diseases and Related Health Problems (ICD) to catalogue SDoH information in inpatient settings; when ICD social codes are used, they are most frequently related to mental health, alcohol, and substance use.⁴ This indicates a missed opportunity for collecting and analyzing SDoH data. Awareness campaigns promoting the utilization of ICD codes among providers and other members of the care team will be necessary to improve the completeness of the claims data received by the APCD.

⁴Torres JM, Lawlor J, Colvin JD, et al. ICD social codes: an underutilized resource for tracking social needs. *Med Care.* 2017;55(9):810–816

Virtual Health Record

Topline Story

A Virtual Health Record (VHR) provides a comprehensive synthesis of a patient’s medical history, including encounter information and demographic information, including geocoded residential address, insurance status, race/ethnicity and next of kin. Rather than trying to access patient information scattered across organizations and siloed within various systems, a VHR will integrate multiple data sources into a single, HIPAA-compliant portal for easy access among clinical and community providers working with patients wherever they seek care. In addition, the VHR will enable patients to achieve greater autonomy over their health status and healthcare coverage information.

The Core Data Analytic Solution (CDAS) will allow for data stratification by health risk. The integration of this significant analytic capability into the VHR will better inform decision-making and care coordination among providers of health and social services.

Overall, viewing the VHR through a lens of health equity ensures that this tool is used to promote information sharing that will advance the quality of care and present opportunities to reduce redundancies and improve cost-effectiveness among health systems.

User Stories

These user stories outline how various participants would utilize and benefit from a Virtual Health Record:

A	Enabling synthesis of accessible health information through a single-use interface
A1	Patients need access to their personal medical information and the personal medical information of their dependents so they can manage my family’s health.
Value	<ul style="list-style-type: none">● I want to sign into a single portal to securely access my family’s medical information.● I want to sign into a single portal and provide demographic information about myself and family members so that the provider can make more informed decisions on our healthcare needs. For example, I would like to include my home address, insurance, car ownership or public transportation needs that will inform my provider’s ability to provide the appropriate referrals.● I want to be able to easily access my VHR from a mobile app, tablet or desktop, so that if I go to a healthcare or social service provider, I can easily

	<p>look up and share details about my medical history. It is important that it is a simple process for me to choose who has access to this information.</p> <ul style="list-style-type: none"> ● When I go to a healthcare provider, I want to be able to elect that they have access to general intake information and authorizations so that I can just review, make changes and approve information that I have provided in the past. ● If I experience a change in insurance, I want my VHR to be automatically updated. ● When my provider is referring me to a specialist or another provider, I want them to be able to consider the distance from my house and my transportation needs, through viewing my geocoded residential address in relation to address of provider site. ● When my provider writes a prescription, I want to be aware of my insurance status and if my prescription is covered, so I can know my out-of-pocket cost and if it is financially viable for me to take.
A2	<p>I am a provider working in an urgent care setting. At the point of care, it is equally important for me to understand my patient’s medical needs and encounters as it is to know their lived circumstances. I want to provide my patients with the most appropriate and effective care and lower the chance of unnecessary or redundant treatments.</p>
Value	<ul style="list-style-type: none"> ● I want a clinical information that allows me to access multiple data sources such recent clinical encounter, drug prescriptions, procedures, reports (labs, x-rays, etc.) to best understand my patient’s current medical history. ● It is important for me to understand the context of a patient’s life and their behaviors. I want an additional module that provides information on their insurance status, neighborhood and possible other determinants that impact health to inform discussion about additional community resources that would be relevant and beneficial for them. ● I want to stratify conditions by clinical risk groups to identify the disease severity of an individual in comparison to those in their neighborhood versus the wider population. ● I want to be able to see clinical guidelines and protocols side-by-side with patient information so that I can reconcile standards of practice with personalized approach to care. ● I would like to see a current list of prescription medications so I can mitigate any possible drug-drug interactions. ● I want to be able to input new data into a diagnostic module that allows me to request and view tests and lab results. I would like to be able to map

	patients with similar health conditions by geocoded residential address to identify health hotspots.
A3	I am a community health worker , working at a community-based organization . I would like to meet the essential needs of my clients by offering the right services and referrals. Accessing my client’s VHR will allow me to better understand the barriers they face and meet the breadth of their health and social determinants-related needs.
Value	<ul style="list-style-type: none"> ● I want to be able to access my clients VHR on a phone or tablet when I am meeting with them in a community setting. ● I want to be able to input information such as referrals or observations from home visits into their files, so it is accessible to any of my client’s health or social service providers. ● I want to be able to input information from client interactions (e.g. appointments or home visits) into the VHR. ● I also want to be able to update information, such as changes in address, so that providers have the most current contact information. ● It is important to know if my client has a change in insurance or is approaching termination of insurance, so that I can help them navigate changes in accessing health and other social services.
B	Understanding the impact of VHR in reducing healthcare redundancy and improving outcomes
B1	It is important for a healthcare system to have the capacity to measure the impact of consumer ownership of personal health data.
Value	<ul style="list-style-type: none"> ● I want to know the frequency of use of how often patients within my system are accessing the VHR and if it positively impacts their quality of healthcare ● I want a notification if there is a change in claims between patients using their VHR versus not. ● I want to see a reduction in duplication of services and lower healthcare costs. I want to see trends that illustrate any improvements in coordination of physical care, behavioral care, and social care as a result of VHR use. ● Based on data, I want to utilize CHWs to teach patients how to navigate their VHR to better maintain their health.

Alternatives

In the current system, the patient has to identify resources to support their own healthcare needs. Providers have limited time and ability to support them in making informed decisions on healthcare needs that are relevant to other social determinants and extend beyond direct medical care.

Dependencies

- 1. Reliability of patient-generated data⁵:** In order for providers to adopt VHR as a part of their daily medical practice, they need to be able to rely on the accuracy of the information provided by patients. Synchronization and feedback processes, among others, are needed to establish consistency and maintain the quality and integrity of the collected data.
- 2. Patient concerns with data security and privacy⁶:** For patients to feel comfortable inputting data into the VHR and sharing this information with providers, data authorization policies and security mechanisms will require careful consideration. Furthermore, data backup and recovery systems are essential to ensuring that data is sustainable for continual access.

⁵ Archer, N., Fevrier-Thomas, U., Lokker, C., McKibbin, K.A., & Strauss, S.E. (2011). Personal health records: a scoping review. *Journal of the American Medical Informatics Association*, 18(4), 515–522.

⁶ Raisinghani, M. S., & Young, E. (2008). Personal health records: key adoption issues and implications for management. *International Journal of Electronic Healthcare*, 4(1), 67-77.

Health Equity Dashboard

Topline Story

The standardized transmission and display of data is important to communities, providers, and agencies that seek to improve public health and social well-being across Connecticut. Up-to-date information can help these groups make informed decisions about health policy and health systems interventions, educational outreach, and many other efforts aimed at disease control and prevention.

A centralized health equity data dashboard can enhance the ability of communities and organizations to understand disease prevention efforts and address other persistent barriers to quality of life.

A health equity dashboard would allow users to compare relevant, local-level data (by neighborhood, race/ethnicity, gender, insurance status, and other factors) to surrounding city, regional, and state averages on issues related to social factors, healthcare, and health outcomes. It could serve as a portal to access publicly-available data for planning and evaluation.

User Stories

A	Facilitating planning, communications, and advocacy activities related to improving the health of all Connecticut residents
A1	Policymakers can better understand barriers to health and well-being.
Value	<ul style="list-style-type: none"> I want to track progress in my area (e.g., data broken out by legislative district), as compared to statewide health goals. I want to understand how information related to policy initiatives (e.g., efforts to improve community health outreach, efforts to expand services such as transportation to underserved areas) relates to overall population health improvement and potential barriers to health within specific groups.
Additional data sources	<ul style="list-style-type: none"> Geographic or demographic data that are relevant to policymakers, such as legislative district information (see DataHaven’s statewide legislative district profiles as an example: https://www.ctdatahaven.org/data-resources/connecticut-state-legislativ)

	<p>e-district-profiles).</p> <ul style="list-style-type: none"> ● Relevant program data (e.g., transportation routes)
A2	<p>Community-based organizations and health systems want to understand key health conditions among the population living in a neighborhood or service area and use that information to inform planning and advocacy.</p>
Value	<ul style="list-style-type: none"> ● I want more reliable ways to access data on health outcomes and health equity, broken down by neighborhood and specific populations. ● I want to benchmark my own program data against the population-level data to understand who I am serving. ● I want the ability to visualize various factors in one place to examine and present interrelationships within the data to my stakeholders. ● I want the ability to present graphics and visuals about health in my area to a general audience.
Additional data sources	<ul style="list-style-type: none"> ● Overlays of other social and geographic data. ● Links to related resources (e.g., statewide health equity reporting, vital statistics, advocacy resources).
A3	<p>High-security, protected features could allow qualified local agencies to access real-time transmission of information that is useful for public health reporting and the prevention of outbreaks, such as syndromic surveillance, electronic lab reports, and trends.</p>
Value	<ul style="list-style-type: none"> ● I want to use granular data for real-time planning, action, and crisis response.

Alternatives

Without a Health Equity Dashboard, policymakers, community-based organizations, and health systems must rely on information from a multitude of sources. Reliable data may not be readily accessible at the neighborhood level.

Dependencies

1. **Capacity to collect and analyze accurate data at the neighborhood level:** Before different variables can be displayed, significant analytic resources are needed to ensure data quality and interoperability across various factors.
2. **User friendly design:** The dashboard needs to be intuitive due to potentially limited internal technical capacity.
3. **Data timeliness and longitudinal storage capacity:** To be most useful, especially for surveillance activity, data would need to be integrated into the dashboard in a timely fashion, as well as stored for aggregate and trend analysis.

Health Enhancement Communities

Topline Story

The Connecticut State Innovation Model (SIM) Program's Health Enhancement Community (HEC) model aims to improve the health and well-being of Connecticut residents and reduce rising healthcare costs by leveraging and building on community-based prevention activities that are underway across the state.⁷ Because health inequities drive poor health outcomes, health equity will be embedded in the HEC Initiative.

HECs will initially focus on two health priorities that are critical for Connecticut:⁸

- Improving well-being for children (pre-birth to age 8) by ensuring that children are in safe, stable, and nurturing environments through preventing Adverse Childhood Experiences (ACEs), and by increasing protective factors that build resilience and mitigate the negative impact of toxic stress.
- Improving healthy weight and physical fitness for all residents through various prevention and health equity strategies.

Tracking local-level data that relates to health improvement, in many cases for vulnerable populations with complex social and health needs, is likely to be critical to the funding of this model. Over time, HECs may coordinate or supervise initiatives that use value-based payment models and require related evaluations.

It is likely that HECs will be accountable for demonstrating improvements in health within their geographies based on specific measures of health equity as well as on overall population health improvements. Payment models may call for evaluating the successful outcomes and implementation of evidence-based interventions that have been documented to improve health at a population level, though their impact on specific at-risk populations have not necessarily been evaluated. For example, there are some national efforts to use HIE-based clinical and social data to understand children at greatest risk of adverse childhood experiences (ACEs), who may have complex needs that are not served by current healthcare and social service systems.⁹ For these reasons, health equity analytics enabled through the Core Data Analytic Solution (CDAS) may help HECs align existing interventions and implement new interventions that specifically address health as well as health equity.

⁷ Learn more in the Health Enhancement Community Model Design Report, available at <https://portal.ct.gov/-/media/OHS/SIM/Population-Health-Council/2018/Meeting-10-29-18/HEC-Report-for-PHC-Review-Only-10-22-18---WEBSITE.pdf>

⁸ State of Connecticut HEC Pre-Planning Request for Proposals, August 2019.

⁹ Nguyen, L. H. (2014). A public health response to data interoperability to prevent child maltreatment. *American Journal of Public Health*, 104(11), 2043-2048.

User Stories

These user stories provide examples of how decision makers and HEC initiatives might take advantage of health equity measures via Connecticut’s data architecture.

A	<p>Harnessing the power of data sharing to enable more effective funding and organizational structures throughout the state that can foster multi-sector collaboration and accountability to promote community health improvement and equity</p>
A1	<p>HEC initiative leadership can track improvements and/or reductions in health equity within HEC geographies and within small population groups residing within the HEC area.</p>
Value	<ul style="list-style-type: none"> ● I want to use small-area health estimates (e.g., estimates for health conditions as well as on inequities within specific neighborhoods or towns) to help pinpoint where the greatest opportunities exist to improve health and to address health equity concerns. ● I want to use data that are disaggregated by race/ethnicity, gender, age, insurance status and other factors in order to identify groups in need and allow decision makers to better target the resources that will be associated with each HEC.
Additional data sources	<ul style="list-style-type: none"> ● High-quality geocoding and use of complex techniques to create usable estimates for small areas. ● Data provided through the HIA can be overlaid with other sources of local-level information (such as data on social needs, housing problems, or population growth) to help understand current and future trends. ● In the most disadvantaged communities, it could be useful to overlay datasets from the Connecticut Dept. of Corrections, the Homeless Management Information System, and various housing data to understand areas of highest risk for certain health conditions (such as injury).
A2	<p>HEC initiative leadership can use disaggregated data to more effectively engage and empower the populations residing within the service area.</p>
Value	<ul style="list-style-type: none"> ● I want to develop a long-term plan for sustained resident engagement within my community and ensure that all voices are represented. Since

	<p>the distribution of health-promoting resources within communities is a goal of this initiative, local residents should be empowered and engaged in all aspects of the planning process.</p>
Additional data sources	<ul style="list-style-type: none"> • More granular race/ethnicity breakdowns to enable the creation of data products that are more tailored to specific communities within each area (e.g., one town may have a large South Asian population). • More granular breakdowns of data based on the experiences of residents within a particular area (e.g., persons returning from incarceration, recent graduates from a particular high school).
A3	<p>State policymakers and HEC funders can analyze disaggregated data to create HEC performance measures that relate to populations at greatest risk of poor health outcomes, and use that information to monitor progress or award funding.</p>
Value	<ul style="list-style-type: none"> • I want to develop new metrics that are based on the integration of cross-sector data about individuals with complex health and social needs, and then use them to better understand local differences in service outcomes and populations. This may enable a more informed and equitable distribution of funding, as well as advance the creation of HEC performance measures that relate to the most vulnerable populations (e.g., children experiencing ACEs, adults who are at greatest risk of nutrition-related illnesses). • I want to use performance measures to hold HEC organizations and communities accountable for serving the populations that are likely to experience the greatest health risks and contribute to high social service costs in the future. I want these measures to assess inclusivity and equity to ensure that no populations are excluded from receiving needed services.
Additional data sources	<ul style="list-style-type: none"> • Data from multiple sources at multiple levels that reflect individuals' experiences of the healthcare system, community and individual risk factors and exposures, including health equity measures (insurance access, demographics, and other social and environmental factors). • Ability to create and validate performance measures in an ongoing manner, using benchmarking data across the system.

Alternatives

While models similar to HECs may continue to grow, without capacity for conducting health equity data analytics within the context of other decision-making and evaluation tools, these initiatives will be limited in their ability to serve populations within their area(s) in the most equitable and effective manner possible. Information on health equity that could be gleaned from other methods may not align with sources used for program management. HEC leadership may miss the fact that even if health and well-being conditions are improving for a region overall, they may be worsening for a specific group.

Dependencies

1. **Limited and/or known reporting biases:** When using and displaying health equity data, efforts must be taken to ensure the completeness and accuracy of the underlying demographic and other characteristics. There will likely be some limitations to data sources pertaining to health equity, so interpreting the data correctly in the context of overall population health improvement will require it to be analyzed and well understood prior to use.
2. **Incentives for HECs to use equity within performance measures:** Without requirements or other incentives for HEC initiatives to use health equity information within decision making and program monitoring, the impact of health equity data to the operation of HECs may be limited, especially for HEC initiatives that cover geographic areas that have more homogeneous demographic or socioeconomic characteristics.

Environmental Health Dashboard

Topline Story

Environmental hazards such as lead, air pollution, asbestos and radon are known risk factors for various health conditions including cognitive and developmental issues, respiratory disease, cancer and heart conditions among others. To improve the health and wellbeing of communities, Connecticut has established Healthy Connecticut 2020 goals for mitigating exposure to environmental risk factors in the home, drinking water and outdoor air. Improving the environmental health surveillance infrastructure will promote accessibility of data to support these existing efforts including informing patient-centered care, targeting community interventions and advancing local and state advocacy efforts for policy change.

Overall, the environmental health dashboard will serve as the user-friendly platform that enables users to clearly understand, identify and demonstrate the pressing environmental health issues facing Connecticut residents. Medical outcomes data from state’s Core Data Analytics Solution (CDAS) will be paired with environmental hazards and exposures data from external sources. The CDAS will provide users needing to compare environmental factors contributing to poor health outcomes with the capability to stratify the population by health risk at both an individual and population level. This can be filtered by insurance status and expanded geographic and race/ethnicity categories.

There is potential for crossover or synergistic uses of the environmental health dashboard with other population-level analytics such as the health equity dashboard.

*CDAS may obtain this information from a variety of data sources, including state databases, and local health departments, claims data from the All Payers Claims Database and from EHRs. Aggregated data will be available for public use while disaggregated data will be made available with additional agreements between OHS

User Stories

These user stories explain how CDAS capabilities are useful in enabling HIA participants to identify, monitor and address environmental exposures among Connecticut residents.

A	Notifying providers of environmental hazards or risks at point of care
A1	A health system wants clinicians to be notified of environmental risks facing patients at the point of care, so that they can prevent greater harm among patients.
Value	<ul style="list-style-type: none">Healthcare providers in my system can receive a notification for heightened environmental health risk when seeing patients that reside in areas proximate to exposure incidents (lead, asbestos, radon etc.).

	<ul style="list-style-type: none"> ● It is important to know how many patients in our health system are living in areas where there are confirmed environmental exposures, and the proximity between a patient’s home and the identified hotspots. Notifications could be color coded to indicate how concentrated the risk is, based on residential-level data, which could, for example, prompt providers to perform a lead screening. ● As a health system, I want to be prepared and ready for a possible influx of patients at a certain time of year, for example, seasonal trends of asthma and ER usage, or as a result of episodes of extreme weather, which can result in water contamination from flooding. ● I want to receive alerts if there is a concentration of hospital admissions related to environmental health exposures (e.g. positive lead screenings, waterborne disease). I want to use geocoded residential addresses to map patients that are admitted, with the ability to filter by race/ethnicity.
A2	I am a clinician , specializing in family primary care. Understanding environmental risks that my patients are exposed to is critical to informing treatment decisions and providing additional resources.
Value	<ul style="list-style-type: none"> ● I want to receive an alert so I can provide anticipatory guidance to parents of children that are living in an area with a high risk of environmental health exposure (e.g. lead). ● I want to see where my patients live on a heat map that displays various environmental exposures by neighborhood, so that I can discuss and provide educational materials about environmental hazards (e.g. asbestos) and persuade patients to utilize a community health worker
A3	I am a community health worker (CHW) . I want to be able to assist my clients by reducing their exposure to environmental hazards and addressing their other social determinants of health, while helping connect them to clinical care and community resources.
Value	<ul style="list-style-type: none"> ● I want to understand the type of environmental exposures that my clients may face in their most frequent environment, which includes the neighborhoods where they live, work, or attend school. ● I want to be able to see a neighborhood-level map of substandard housing conditions. ● I want the additional ability to know specific information about buildings in their neighborhood, for example if a house was built prior to 1978, and if their building and other buildings in the surrounding areas have received a Healthy Homes inspection over the past 5 years. This will help me monitor and take actions needed to improve the quality of life of children who may

	be negatively impacted by environmental health issues, such as those caused by lead exposure.
B	Promoting the safety of communities and advancing accountability efforts to mitigate environmental health risks
B1	I am a community-based organization and I would like real-time updates about exposure incidents, so I can raise awareness in my community and target educational campaigns and outreach activities that help to mitigate risk.
Value	<ul style="list-style-type: none"> • I want to use neighborhood-level aggregated clinical data to determine the need for a Healthy Homes initiative that targets specific hazards, such as asbestos or radon. • I want to a visual heatmap of environmental hazard hotspots to help me proactively offer clients assistance with reporting, seeking local enforcement action or renumeration, and connecting them with a CHW to provide home visits and educational awareness. • I want to be able to filter the map by race/ethnicity and insurance status so that I can target outreach to specific areas in a culturally sensitive manner. For example, providing linguistically appropriate asthma educational materials to communities with a significant population of nonnative English speakers..
B2	I am an advocate . I need health data to help me talk to policymakers about supporting policies that seek to decrease environmental risk factors (e.g. establishing a minimum housing code for the state of Connecticut).
Value	<ul style="list-style-type: none"> • I want an interface that is easy to use and navigate. • I want to examine trends between geocoded residential address and the frequency and types of claims related to environmental exposure with the ability to filter by expanded race/ethnicity categories, and health insurance status. • I want to examine neighborhood-level data from the results of Healthy Homes inspections side-by-side with health outcome data of individuals living in these areas. • I want to be able to compare trends poor air quality days with ER admissions with the ability to filter by expanded race/ethnicity categories. • I want to be able to map ER or urgent care admissions by geocoded residential addresses overlaid by other environmental exposure data to demonstrate the link between environmental exposures and health conditions (e.g. asthma among children).

	<ul style="list-style-type: none"> I want to see specific environmental exposures trend across neighborhoods. I want to be able to observe changes over time to assess if the initiatives that I am supporting on a policy level are making a tangible impact at the individual and community level. I am also interested to see these trends overlaid by insurance status and race/ethnicity to help link the issues of housing, economic investment and health.
B3	I am an employee at the Department of Public Health . As a state agency, we want to more efficiently use our resources to target direct city employees to take enforcement action (e.g. lead paint).
Value	<ul style="list-style-type: none"> We want to have access to aggregated clinical data that can be mapped on to residential-level environmental exposure hotspots in order to proactively target enforcement and mitigation efforts. We want to be alerted if there is a concentration of hospital admissions related to environmental health exposures (e.g. positive lead screenings, or waterborne disease), so that we are positioned to intervene before an exposure results in a widespread consequences.

Alternatives

Without an Environmental Health Dashboard, policymakers, community-based organizations, health systems, and providers must rely on information from a multitude of sources. Reliable data may not be readily accessible at the neighborhood level.

Dependencies

- Capacity to collect and analyze accurate data at the neighborhood level:** Before different variables can be displayed, significant analytic resources are needed to ensure data quality and interoperability across various factors.
- User friendly design:** Need dashboard to be intuitive due to limited internal technical capacity.
- Data timeliness and longitudinal storage capacity:** To be most useful, especially for surveillance activity, data would need to be integrated into the dashboard a timely fashion, as well as stored for aggregate and trend analysis.

NEXT STEPS

Socializing & Refining User Stories

- All In National Meeting 2019, Baltimore, MD | October 15–17
- 2019 CPHA Annual Meeting & Conference, Plantsville, CT | October 21
- CT Health IT Advisory Council, Hartford, CT | November 21
- CT Healthcare Cabinet, Hartford, CT | December 10

Potential Use Case/User Story Additions

- Electronic clinical quality measures (eQOMs)
- Additional CDAS population health analytics topics (e.g. opioid/drug overdoses, maternal/child health, chronic disease)—see “Environmental Health Dashboard”

Health Equity Data Analytics Team

Health Equity Solutions, Inc.

Yale Equity Research and Innovation Center (ERIC)

DataHaven

Draft report prepared for the Connecticut Office of Health Strategy (OHS)

October, 2019