

Ohio Data Warehouse Case Study

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Executive Summary

State data warehouses provide an opportunity to efficiently integrate, manage, and share multiple sources of data from state agencies, community providers, and public health agencies. Through linking housing data to public health data, data warehouses can help guide public health action to address individual and population health needs for people experiencing homelessness (PEH).

The Centers for Disease Control and Prevention (CDC) depends on states and other jurisdictions to collect and report data on public health concerns. The CDC's ability to make evidence-based recommendations to support the overall health and well-being of PEH is predicated on receiving timely and complete data. Data warehouses provide an opportunity to enrich states' public health data that is reported to CDC. Enhanced public health data can inform CDC efforts on public health interventions, direct research, and guide prevention efforts for PEH.

This case study captures Ohio's experience with integrating data from Homeless Management Information Systems (HMIS) to build the Ohio Human Services Data Warehouse (OHSDW) and describes how Ohio is utilizing the data warehouse.

The OHSDW was created to gain a holistic view of people accessing homelessness services and poverty through cross-system data sources; to assess and address gaps through collaboration; to furnish reliable, comprehensive data for state and local planning; and to inform funding and policy-making decisions [1].

Two primary factors contributed to the successful development of the OHSDW and incorporation of HMIS data: 1) all Continuums of Care (CoCs) in the state participated in the process and provided data and 2) the technical skill to incorporate data from diverse HMIS reporting systems into the data warehouse, as provided by staff of the Ohio Housing Finance Agency. Ohio's challenges include staffing to support the OHSDW; the perception that data request processes are cumbersome; and the need to recruit additional Steering Committee and data partners to enrich the data warehouse.

This case report was produced collaboratively by scientists at CDC and MITRE, the Health Federally Funded Research and Development Corporation (Contract Number 75FCMC18D0047), in consultation with multiple professionals who established and manage the Ohio Data Warehouse.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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1 Introduction

Homelessness is an important factor that can impact an individual's health and well-being. People experiencing homelessness (PEH) are at increased risk of exposure to infectious diseases and violence and may experience higher rates of untreated chronic conditions [2]. A person's housing status (i.e., whether someone is experiencing homelessness or is housed) is also a key social determinant of health (SDOH). SDOH are the social, economic, and environmental factors that affect health outcomes and quality of life.

The U.S. Department of Housing and Urban Development (HUD) is the federal entity that administers homelessness assistance programs and funding to state and local governments and nonprofit housing service providers for individuals and families affected by homelessness [3]. HUD requires federally funded homeless assistance programs to collect data on individuals and services within a Homeless Management Information System (HMIS) database.

Data on homelessness are imperative to understand unmet social and healthcare needs for PEH (and other critical populations) and ensure access to essential public health services. HMIS data are the most comprehensive source of data on homelessness. HMIS data can be integrated into a data warehouse, which can also include medical records, public health data, and other services data (e.g., welfare and supplemental nutrition assistance programs), to provide a more complete picture of the needs of individual PEH and the larger population. A data warehouse can centralize data management and link disparate data to coordinate social and healthcare services and prioritize interventions for PEH.

A state data warehouse is a centralized repository for storing, managing, and sharing data from various sources such as state agencies, community providers, and public health agencies. Data warehouses consist of at least two datasets from different sources but may contain multiple state agency datasets [4].

The Centers for Disease Control and Prevention (CDC) sought to better understand states' experiences with implementing data warehouses and how they are utilizing this tool to obtain better data on homelessness and address its impacts on health. This case study describes the Ohio Human Services Data Warehouse (OHSDW) and how integrated data are used to understand homelessness and its impacts on health. The benefits of data linkage to improve planning and to provide an evidence base for policy action to improve population health are outlined. Additionally, the case study enumerates the challenges Ohio encountered with implementing a state data warehouse and provides lessons learned for other states considering establishing a data warehouse.

Information presented in the report was collected through key informant interviews and a review of available documents. For more detail on the methodology used in conducting the case study, see 0.

2 Background

The concept of a HMIS database originated from a 1998 Congressional mandate directing HUD to explore the implementation of a data system to track homelessness. In 2001, the HUD Appropriations Act funded HMIS development. In 2004, HUD released the HMIS data and

technical standards which local Continuums of Care (CoCs) are expected to follow when collecting information about PEH [5]. CoCs are local organizations within states mandated by HUD to provide planning and coordination for housing services and funding. The HMIS data collected includes demographic and eligibility data on individuals and housing services received by PEH and individuals most at-risk of homelessness.

CoCs can choose the software they use for collecting HMIS data and set their own data management processes. Each CoC's ability to choose their own HMIS reporting software can complicate the integration of varied systems' data into a centralized state data warehouse. Information technology (IT) vendors develop differing HMIS software solutions, but all software must comply with HUD data collection, management, and reporting standards [6]. In states that invest in the creation of data warehouses, CoC participation in providing HMIS data to statewide data warehouses is voluntary.

CoCs differ in their affiliation and location. They can consist of local governments, nonprofit organizations, advocacy groups, and other interested parties. They are located in urban and rural environments. At times, rural communities will join together to create a single CoC in the state known as a Balance of State (BOS) CoC. There is no limit on the number of CoCs in a state. For instance, in 2021, Wyoming had four CoCs while California had 44 CoCs. At present, Ohio has nine independent CoCs, one of which is managed by the Coalition on Homelessness and Housing in Ohio (COHHIO) [7].

3 The Ohio Human Services Data Warehouse

3.1 Data Warehouse Creation

Ohio created the OHSDW to link and share statewide data on PEH and those at-risk to improve homelessness services and access to those services through planning and policy action. The Ohio Department of Development provided initial startup funding to develop the OHSDW. The OHSDW addresses the following goals:

- Gain a holistic view of homelessness services and poverty through cross-system data sources.
- Assess and address gaps through collaboration.
- Furnish reliable, comprehensive data for state and local planning.
- Inform funding and policy-making decisions [1].

Figure 1 shows the timeline for development of the OHSDW, including HUD's creation of HMIS standards.

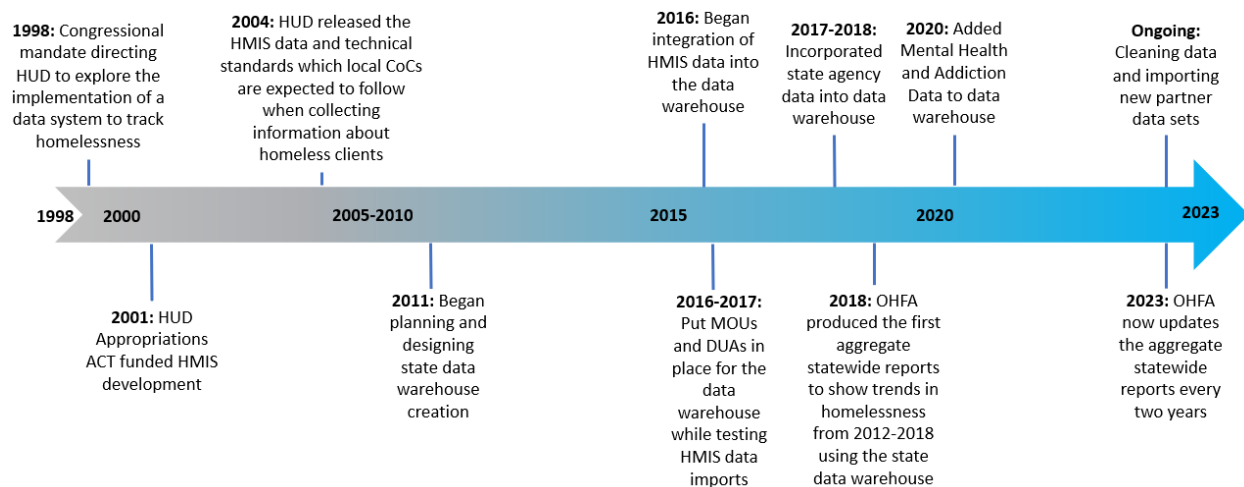


Figure 1: Ohio State Data Warehouse Timeline

Accessible Text Version: 1998- Congressional mandate directing HUD to explore the implementation of a data system to track homelessness; 2001- HUD Appropriations act funded HMIS development; 2004- HUD released the HMIS data and technical standards which local CoCs are expected to follow when collecting information about homeless clients; 2011- Began planning and designing state data warehouse creation; 2016- Began integration of HMIS data into the data warehouse; 2016-2017- Put MOUs and DUAs in place for the data warehouse while testing HMIS data imports; 2017-2018- Incorporated state agency data into data warehouse; 2018- OHFA produced the first aggregate statewide reports to show trends in homelessness from 2012-2018 using the state data warehouse; 2020- Added Mental Health and Addiction Data to data warehouse; 2023- OHFA now updates the aggregate statewide data reports every two years; ongoing- cleaning data and importing new partner data sets.

Ohio formed the OHSDW Steering Committee to lead planning for developing the state data warehouse. The OHSDW Steering Committee is composed of nine participating CoCs and three state agencies: the Ohio Housing Finance Agency (OHFA), the Ohio Department of Mental Health and Addiction Services, (OhioMHAS) and the Ohio Department of Development. Each member of the steering committee contributes data to the warehouse, except for the Department of Development, which plans to contribute data in the future. The Ohio Department of Development was instrumental in developing a data use protocol, garnering support from the CoCs, and provided funding for the OHSDW.

The planning process began in 2011 and lasted approximately five years to accomplish the following objectives:

- Foster collaborative partnerships between CoC and between state agencies
- Solidify partner roles
- Develop governance and guiding principles
- Define project vision and goals, including a timeline for bringing other state agencies on board
- Develop policies and procedures
- Determine programmatic and technical requirements
- Define universal data elements
- Design export procedures (data preparation and transmission)
- Develop warehouse platform, server structure, and establish security protocols

Steering Committee decisions are typically determined by consensus, but if consensus is not achieved, a vote will occur. Each member of the Steering Committee, including all nine CoCs, has one vote except for the COHHIO ex-officio member, who serves as a non-voting member,

and represents the coalition [8]. When making decisions regarding data usage and data sharing, agencies that provide data also have a vote. For example, if OhioMHAS provides data for an analysis, they have a vote on how data are used and shared.

The initial tasks of the Steering Committee were to oversee warehouse implementation and to develop policies regarding participation protocols, data use and privacy agreements, and protocols for reporting and conducting analyses. The committee also determined the frequency of data uploads and the type of data to include in the warehouse. All agencies and organizations that partnered on the development of the OHSDW are listed in Table 1.

With planning complete, Ohio implemented the data warehouse in 2016-2017 with the incorporation of participating CoC HMIS data. Additional data sources were first added in 2018 and included mortality data from the Ohio Department of Health (initially years 2012-2018) and, in 2019, data from jail services in Cuyahoga County, which includes the Cleveland area (initially years 2012-2018). OhioMHAS data (initially years 2012-2018) were incorporated in 2020. The intent is to continue to add updated data from these sources to the OHSDW.

In the future, the OHSDW would like to incorporate additional data sets, including employment data from the Ohio Department of Job and Family Services and Medicaid data from the Ohio Department of Medicaid. This will expand Ohio’s ability to further understand PEH service utilization and will allow for a more comprehensive view of PEH needs and increase data sharing among state agencies that serve PEH.

Table 1: Ohio Human Services Data Warehouse Partners

Agency/Organization	Role in HMIS Integration	Notes
Ohio Housing Finance Agency (OHFA)	Hosts and manages the data warehouse.	OHFA uses federal and state resources to finance housing opportunities for low- and moderate-income Ohioans through programs that develop, preserve, and sustain affordable housing throughout the state.
Ohio Department of Mental Health and Addiction Services (OhioMHAS)	Member of the Human Services Data Warehouse Steering Committee	Provides leadership of a statewide mental health and addiction prevention, treatment, and recovery system.
Ohio Department of Development	Member of the Human Services Data Warehouse Steering Committee	Provides resources to Ohio communities to conserve and expand affordable housing stock, address homelessness, and provide emergency housing assistance to Ohioans in need. Their Office of Community Development Homeless Crisis Response Program provides grant funding to agencies and organizations for emergency shelter operations, homeless prevention, and rapid rehousing projects.
Coalition on Homelessness and	Manages the BOS CoC, which encompasses 80 Ohio	Nonprofit coalition that provides education, research, training, public policy advocacy,

Agency/Organization	Role in HMIS Integration	Notes
Housing in Ohio (COHHIO)	Counties. COHHIO has two members on the Human Services Data Warehouse Steering Committee: a BOS CoC representative who is a voting member and an ex-officio, non-voting member.	and legislative recommendations to end homelessness and increase affordable housing in Ohio.
Ohio CoCs*	Collects and reports HMIS data to the data warehouse and to HUD for homelessness and housing grants to fund programs and projects. Each of the nine CoCs, including the BOS CoC, have a representative on the Data Warehouse Steering Committee	Nine statewide local/regional CoCs that provide intake and assessment services, emergency, transitional and permanent supportive housing. Conducts the HUD Point-in-Time count. ¹
Ohio Human Data Warehouse Steering Committee	Provides governance and policy decisions regarding the state data warehouse. Develops privacy protocols and reviews and determines the outcome of data warehouse requests.	Thirteen-member committee with members from the nine state CoCs, COHHIO (ex-officio/non-voting), OHFA, OhioMHAS, and the Ohio Department of Development.

* Includes the COHHIO.

3.2 Warehouse Structure and Data Sharing Mechanisms

The state data warehouse is stored at OHFA and managed by the Office of Research and Analytics. The warehouse is also supported by a specialized IT contractor hired through the State of Ohio for other OHFA projects. This contractor works as needed on OHSDW activities regarding CoC HMIS data transmission, management, and incorporation and helps with technical issues that may arise when extracting data for the warehouse. After data have been uploaded to the warehouse and matched, the IT contractor distills the records into a more manageable data extract and sends it to the Office of Research and Analytics for analysis. Questions for analysis are determined and guided by both the Office of Research and Analytics and the Steering Committee.

Ohio CoCs do not all use the same HMIS data system, which created challenges with integrating HMIS data into the OHSDW. Initially, seven of the CoCs were using the same HMIS data system and one of the CoCs wrote and shared a custom data export for the seven CoC's to export

¹ The Point-in-Time count is a count of sheltered and unsheltered people experiencing homelessness on a single night in January. HUD requires that CoC's conduct an annual count of people experiencing homelessness in emergency shelters, transitional housing, and Safe Havens and a count of unsheltered people experiencing homelessness every other year (odd numbered years).

the data needed for the data warehouse. The CoCs not using that system had to write their own custom data export into the same data format which created delays and technical issues.

To ensure statewide CoC data compatibility, OHFA adopted the HUD csv data export format required by all CoC HMIS systems. This required a one-time modification to the import process for the data coming into the data warehouse. The export can be done by selecting a menu option without writing custom export code. Since switching to HUD csv data files as the export format from the different HMIS data systems, the process has become much easier. The technical knowledge and time required by CoC staff has decreased substantially.

3.21 Data Linkage

OHFA uses privacy-protecting record linkage (PPRL) to match data while ensuring the privacy of client information 0. The PPRL method that Ohio uses allows a person's data from different data sets to be joined through a one-way hash of data that cannot be decrypted (Figure 2)**Error! Not a valid bookmark self-reference..** OHFA created a Client Hash program that takes personal identifiable information (PII) such as first name, last name, date of birth (DOB), and a portion of a Social Security number (SSN) and transforms it into a 64-digit set of alphanumeric characters. The program also removes PII and any other data that are not part of the filter list of columns approved by the Steering Committee.

A challenge with the Client Hash program is that for the data match to be successful, the fields that are being matched must be exactly the same. If a name is spelled differently or a birthday is incorrect, the hash that is created will be different. To avoid this, CoCs monitor and clean data on a regular basis. This can slow down the process of receiving data extracts as the CoC staff work to address data quality issues. OHFA has worked with CoCs in the past to identify fields that need to be cleaned frequently to help with avoiding delays.

Each participating agency and CoC has the Client Hash program installed onsite. OHFA provides the Client Hash program along with instructions on use and additionally provides phone and email support. OHFA works with agencies and CoCs to help determine the minimal amount of data that needs to be exported from their system and run through the Client Hash program to be included in the data warehouse. The Client Hash program can process an unlimited number of data formats. If input data contains values used to compose the client hash, the PII will be used to compute the hash and then will be stripped from the output data file. OHFA also provides a hash filter file that is used to filter out records that would not be a match in the data warehouse. The filtered output data are consolidated into a compressed or "zipped" file by agency or CoC personnel and uploaded to a secure OHFA transfer site.

To ensure privacy protection for clients, the Client Hash program is run by the CoCs at the local level and OHFA never receives any PII. All data requests to use the data once it's been incorporated into the warehouse is approved or denied by CoC representatives through the Steering Committee review process.

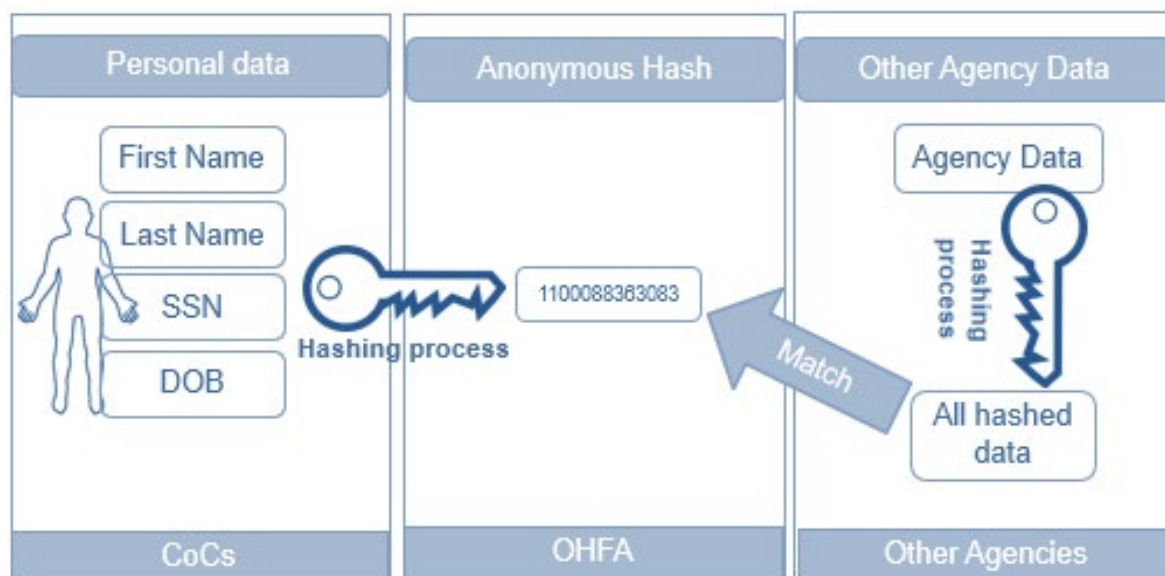


Figure 2: OHFA Hashing Diagram [10]

Accessible Text Version: To the left is a box representing personal data from CoCs, including first and last name, social security number and date of birth. A key representing the hashing process links the personal data with a middle box representing the anonymous hash created by OHFA. To the right is a box that represents personal data from other agencies, which use the hashing process on their data so that it can be matched to the anonymous hash in the OHFA system.

3.2.2 Data Security and Sharing

When CoCs share data in the OHSDW, protecting client and household data is of the utmost importance. Therefore, multiple layers of policies and procedures are in place to ensure that client data are protected. Because it includes some health data, such as from OhioMHAS, under the Health Insurance Portability and Accountability Act (HIPAA), use of OHSDW data must adhere to stringent HIPAA privacy protections against unauthorized data sharing [11]. All individuals who access data directly at any agency are required to sign a Confidentiality Agreement that outlines responsibilities required for people working on data directly.

Additionally, the OHSDW Steering Committee developed client data privacy policies. Those policies govern and control the processes of data reporting, data matching and sharing, and the process for producing reports. Each CoC signs a Data Use and Security Agreement indicating that data quality is the responsibility of the CoC. Continued CoC reliability checks are critical, especially as the data captured in HMIS data systems can sometimes shift from year to year as records are modified and updated [12]. As such, total entry counts or user demographics may shift slightly per year. CoCs are critical to ensuring that year-to-year demographic shifts observed in their data accurately reflect the population they serve.

Entities contributing data to the OHSDW can use warehouse data for reports and analyses. The largest aggregate report is elaborated by OHFA, which uses HMIS data stored in OHSDW to produce periodic aggregated statewide reports on individuals accessing homelessness services. Thus far, OHFA has produced two statewide reports to date that provide a snapshot of PEH characteristics and trends in homelessness over time. Reports include demographic trends, descriptive statistics on disparities by race, ethnicity, and gender, and the residential situation of CoC clients before entering and after exiting the system of CoC support. A 2018 report provided

homelessness data from eight of the nine CoCs. A 2020 report included data from all nine CoCs using the OHSDW HMIS data from 2012-2018 [13]. Plans are underway to produce another periodic report including updated CoC data through 2022.

Standards apply to both externally and internally authored reports. The OHSDW Reporting Policy requires the suppression of data when a requested data set or cell contains less than 25 entries and is modeled on data standards set by the Ohio Department of Health [14]. State agencies, individual CoCs, and other organizations are prohibited from reporting or publishing any information that would identify an individual client.

Certain policies apply only to data sharing with and reporting by external entities. Data requests from outside researchers and organizations are submitted to the OHFA Director of Research and Analytics and brought to the bimonthly OHSDW Steering Committee. Committee members have two business days to submit comments. Subsequently, voting members of the Steering Committee consider each data request to determine approval, disapproval, or approval subject to review. If a request is subject to review, OHFA provides the requested data to the committee to review for approval or disapproval. To be considered, data requests must follow a standardized format and include the research question, time frame(s), geographical location, populations, required data points, and a publication and dissemination plan. Furthermore, organizations that submit data requests that are academic in nature and/or are submitted for research purposes will require Steering Committee approval and a signed written research agreement that adheres to the HUD HMIS Data and Technical Standards and the privacy and confidentiality provisions provided therein [15].

Reports generated by external entities that use data from the OHSDW are subject to content review and approval by Steering Committee vote in accordance with the procedures outlined in the Memorandum of Understanding between the committee and the data warehouse. Each Steering Committee member must review external reports for accuracy within two weeks and provide any requested changes. Voting members also must vote on final approval to share once comments and changes have been incorporated.

It is notable that the existing privacy policies adapted by the Steering Committee and the OHSDW emphasize data privacy between CoCs and other agencies that contribute data to the warehouse. The policies do not facilitate data sharing between these participating entities. This limits the extent that data can be used for real-time inquiries and program planning such as case management and client tracking. Additionally, CoCs must annually competitively apply for HUD funding, which affects willingness to share data to inform statewide programs and interventions. Collaborative agreements that modify existing data sharing and privacy policies between CoCs and other agencies are optional and would allow for increased interactive data usage.

3.3 Applications for Public Health

State data warehouses can provide extensive data for use by public health agencies on understanding and addressing individual and population health. The rich data can help federal, state, and local partners to coordinate resources and collaborate to provide stable housing and impact health outcomes. Individual CoCs use the OHSDW data to investigate the needs of specific PEH populations and design interventions and programs to address homelessness. Key informants shared information, written documentation, and references on the established and

pilot programs described in this section. These programs serve PEH and utilize housing data to include OHSDW data to understand how clients interact with services and systems.

3.3.1 HMIS and Corrections Data Linkages: Stepping Up, Familiar Faces, and Returning Home Cuyahoga

The Stepping Up Initiative is a national effort to reduce the number of people with mental illness in jails. The intent is to prevent those with mental illness from continuing to cycle in and out of jail, which contributes to poor health outcomes for the individual, increased costs to public systems, and does little to improve public safety. The initiative fosters collaborations with a diverse array of partners including: law enforcement, jail administrators, judges, corrections professionals, treatment providers, people with mental illnesses and their families, and mental health and substance use program directors [16].

The Stepping Up Ohio Initiative formed a committee of Cuyahoga County healthcare and court systems representatives charged with identifying ways to improve health outcomes and reduce recidivism for people who are incarcerated. The committee prioritized five areas for improvement:

- Validated tool and screening process
- Information sharing
- Behavioral health linkage and discharge planning
- Psychiatric correctional improvements
- Housing

Cuyahoga County first focused their efforts on improving housing and formed a committee to direct these efforts. Cuyahoga County's Stepping Up Housing Committee was comprised of community leaders, court system management, and frontline staff. The committee started by developing an approach based on the National Association of Counties Familiar Faces Initiative. The committee initiated a data matching pilot study to learn how to better serve and improve outcomes for the heavily impacted incarcerated population, as defined by frequent cycling through jail and court admissions. The study was undertaken to better understand the intersection of shelter, behavioral health, and criminal justice trends to improve existing policies, services, and resource allocation. The effort collaborated with the OHSDW to share a Cuyahoga County jail data set from 2012-2018 with the data warehouse to identify people in the jail system that matched with HMIS shelter data (indicating a history of homelessness) and OhioMHAS data on mental health and addiction services [17].

The Familiar Faces Initiative looked at various measures such as severe and persistent mental illness (SPMI), length of stay in jail, number of jail bookings per calendar year, and demographic factors (including race/ethnicity, gender, and age). Future areas of interest include analyzing the connection between housing data and misdemeanors versus felonies, costs across the jail and housing systems, age at entry, temporal data for homeless entries merged into jail data, the number of people engaged in housing and OhioMHAS services after a first jail booking, and the top 10% of high users of housing, mental health and correctional systems with SPMI [10].

The integration of OHSDW and jail data in Stepping Up and the Familiar Faces Initiative has highlighted the intertwined impacts of incarceration, mental health, and homelessness. These programs used OHSDW data to create a clear evidence base; as a result, the Cuyahoga County Housing Committee also developed Returning Home Cuyahoga, a housing program modeled

after the Returning Home Ohio program administered by the Ohio Department of Rehabilitation and Correction. Returning Home Cuyahoga serves those referred through the Cuyahoga County Mental Health Court with jail shelter diversion and housing re-entry services. A prioritization tool was developed to identify program participants based on the highest acuity of need. The level of need is determined by looking at jail cycling and court admissions, frequency of hospitalizations and crisis episodes, and history of frequent or long-term homeless shelter admissions. Partners (from mental health agencies and probation and court systems) meet monthly to review scores and choose new participants for the program [17].

The Returning Home Cuyahoga housing re-entry program serves 15 participants a year and is advised by the Stepping Up Housing Committee, which consists of representatives from the legal system and housing services providers. The program provides scattered site housing and wrap around care for intensive mental health services. Given the limited capacity of housing for participants, the committee also developed a jail shelter diversion strategy. All systems involved were consulted to develop the diversion strategy. The strategy provides mediation for eligible pre-trial or soon to be released inmates who have a history of homelessness or unstable housing. The goal is to assist them prior to release and help them avoid entering the shelter system. Housing specialists meet with the inmate or defendant to assist in creating discharge recommendations, referrals, and planning to help the client in finding alternative housing to the shelter system. The program can provide monetary assistance, bus tickets, and gift cards to help with re-entry. Figure 3 shows two graphs. The left chart displays cycling through jail, homelessness, and emergency departments 12 months prior to entering the program. All participants cycled through each system, spending several weeks to months in the jail, hospital and/or shelter. The right chart displays cycling through jail, homelessness, and emergency departments after participants entered the program. The data shows that with safe housing and wrap around psychiatric services, the participants reduced the amount of cycling they experienced, which resulted in cost savings to the county.

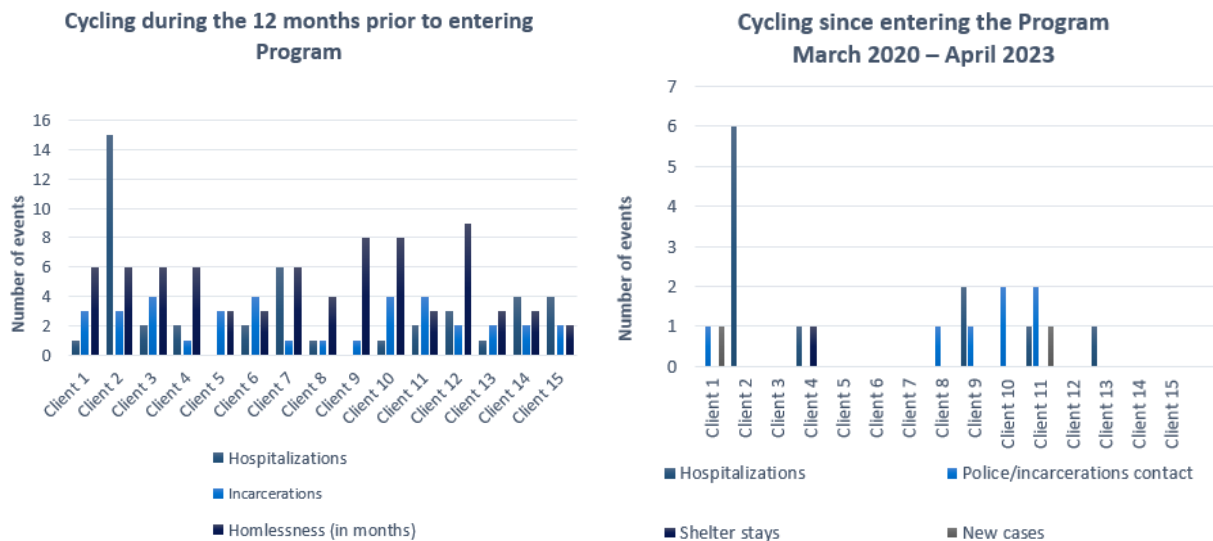


Figure 3: Stepping Up Program Outcomes

Accessible Text Version: Both charts have number of events on the Y axis, and the clients supported through this program, numbered 1 through 15, on the x axis. The left chart shows events in the 12 months prior to the program. For hospitalizations, two clients had none, 4 clients had one hospitalization, 4 clients had two, 1 client had three, 2 clients had four, one client had six,

and one had 15 hospitalizations. For incarcerations, 4 clients had one, 4 clients had two, 3 clients had 3, and 4 clients had four incarcerations. All clients had experienced between 2 and 9 months of homelessness over a 12 month period. The chart on the right shows outcomes over a 3 year period following enrollment (March 2020- April 2023), during which only 5 clients had any hospitalizations (3 clients had one, 1 client had two, and 1 client had been hospitalized 6 times), only one client had stayed in a shelter, and 5 clients had any police or incarceration contact during this period (3 clients with one event; 2 clients with 2 events each over the 3 years).

3.3.2 Insights from HMIS Data Linkages: Planning for Mental Health and Addiction Services

OhioMHAS is one of the three state agencies that serves as a member of the OHSDW Steering Committee [7]. OhioMHAS utilizes the OHSDW by matching housing data with data on funded services for addiction and mental health from the department’s treatment services warehouse. This data includes Medicaid community behavioral health treatment claims and claims for other grant funded services such as those paid for by the Substance Abuse and Mental Health Services Administration (SAMHSA) federal block grant.

Currently, matched data are used for systems level planning. The Affordable Care Act [18] and Medicaid expansion has revolutionized Substance Use Disorder (SUD) services and mental healthcare support in Ohio. Ohio now funds the majority of SUD services through Medicaid. This has freed up SAMHSA funding and local tax dollars to allow Ohio to broaden the pool of state residents served. State leadership can now prioritize funding critically needed housing and recovery support with the savings enabled by Medicaid coverage. Matched data from the OHSDW allows OhioMHAS to understand and describe the needs of PEH to help support prioritizing housing.

3.3.3 Insights from HMIS Data Linkages: Housing Now for Homeless Families

OHFA analyses of OHSDW data found that in 2018 there were 3,000 infants under one year of age whose families were experiencing homelessness in Ohio. COHHIO led advocacy efforts for these children convinced the Ohio governor that more needed to be done for families with children facing homelessness [19]. This led to the governor releasing excess Temporary Assistance for Needy Families (TANF) emergency funding to cover rental and utilities assistance for families with young children [20].

COHHIO became the administrator for the excess TANF funding and developed a program called Housing Now for Homeless Families (HNHF). HNHF funds local nonprofits who provide temporary financial assistance and supportive services to rehouse families. Eligible clients must be homeless or at-risk of homelessness, have custody of a minor child, be eligible for TANF assistance in Ohio, and have been prioritized for assistance by the local homelessness Coordinated Entry system or another locally defined process [21]. The goal is to provide aid to families in need so that children can remain in their homes and increase self-sufficiency and stability for families. HNHF provided interim support as families navigated eligibility determination processes for assistance from other programs, with a potential downstream effect of reduced costs to government social services by ensuring HNHF was not duplicating or supplanting other programs.

3.4 Future Opportunities for Increased Public Health Impact

3.4.1 Future Opportunities for Increased Public Health Impact: Healthy Beginnings At Home

Ohio, like many states, has a large racial disparity in infant mortality. Ohio is ranked as one of the four states with the highest mortality for both Black and Hispanic infants [22]. Healthy Beginnings at Home (HBAH) began as a research project in 2018 to assess whether providing stable housing during pregnancy would impact health outcomes for families of color [23]. A pilot was implemented to examine the impact of housing instability on birth outcomes. Women who entered the program were supported with rental assistance for 15 months followed by a six-month step-down program where housing support specialists assisted families in maintaining stable housing. The pilot showed significant Medicaid savings (discussed under Cost Benefit section below) associated with the program but whether health outcomes were impacted was less clear. For mothers who participated in HBAH, 78% of infants were born full-term at a healthy weight, compared to 55% of infants in a control group whose mothers did not participate. However, the study size was not large enough for these findings to be statistically significant. Mothers self-reported their health outcomes with no notable differences between those enrolled in HBAH and the control group [23]. Longitudinally, the program aims to track participants for three years, with one year after any rental assistance.

HBAH data are collected in HMIS data systems, but HBAH data are not imported into the OHSDW and are kept separate given program restrictions on data access and privacy. Evaluators noted, as a limitation, the burden of establishing data sharing agreements between organizations and recommended that future iterations should focus on facilitating data sharing and improving consistent and timely reporting [23]. HBAH 2.0 is currently underway and enrolling participants to expand the research study. Interviewees noted that the intent is for the HBAH program to be available statewide at some point.

Incorporating HBAH data in the OHSDW, particularly if Medicaid data were also incorporated, could relieve some burden of implementing data sharing agreements and help with standardizing data collection to improve program reporting and measurement of health outcomes.

3.4.2 Future Opportunities for Increased Public Health Impact: OhioMHAS

OhioMHAS use of the OHSDW is focused on understanding PEH needs by analyzing matched data and diagnosis codes for behavioral health conditions and SUD. While the department is not currently using the matched data for resource allocation or care and services coordination, there is interest in using aggregate data for justifying funding requests to the Ohio Legislature as well as for informing grant applications. Additionally, the department plans to look at using data for services planning purposes.

3.5 Cost Benefit

To establish and develop the OHSDW, Ohio spent approximately \$100,000 per year on costs for an IT contractor. Currently, IT costs are approximately \$44,000 annually. Initial costs for setting up the hashing program and extract process were a budget driver but moving forward, the OHSDW has been relatively inexpensive to maintain. The OHFA Office of Research and Analytics allocates approximately 10% of a staff member's time to support the data warehouse.

While initial and ongoing costs must be planned for, investing in the development and maintenance of a state warehouse can provide cost benefit through data insights to better utilize and redirect funding, when needed. Additionally, the ability to enumerate cost savings to participating programs can ensure support and continuation of services for PEH to improve health outcomes as described in the following examples from Ohio programs.

3.5.1 Cost Benefit: Housing Now for Homeless Families

Data from the OHSDW has been used to mobilize state leaders in Ohio to maximize federal funding to implement innovative solutions in providing housing for families with young children. The HNHF program discussed above grew from an initial pilot implemented in October 2019 with \$250,000 in TANF funding to \$1 million in TANF funds in early 2020 after an executive order by the governor. A second executive order followed later in 2020 to provide an additional \$15 million in TANF funding to house families [21].

The TANF funding provided temporary assistance to help families stay housed while they navigated eligibility determination processes for assistance from other programs, without duplicating or supplanting other programs. Redirecting excess TANF funds not only maximized the state's use of its resources but also extended critical support to families during the COVID-19 pandemic. Without the comprehensive data provided by the OHSDW that allowed a full picture of Ohio families in need, young children and their families would not have received this vital housing assistance.

While TANF funds are no longer available to support HNHF, the state leaders involved agree that the model is a very effective way to serve families. COHHIO, the Ohio Department of Job and Family Services, the Ohio Department of Development, and the Governor's office are committed to finding a way to continue the program. COHHIO continues advocating that HNHF be included in the state's budget as a permanent line item.

3.5.2 Cost Benefit: Healthy Beginnings at Home

The HBAH program was a great success from the perspective of Medicaid savings. For those infants whose mothers enrolled in the program and were stably housed during their pregnancy, the average cost for delivery was over five times less than the infants in a control group whose mothers did not receive housing assistance. The costs savings were attributed to mothers who enrolled in HBAH having healthier babies with lower utilization of costly neonatal intensive care [23].

Figure 4 below shows Medicaid spending for HBAH intervention and control group participants. HBAH participants had lower total costs to Medicaid than the control group households, who did not receive rental assistance.

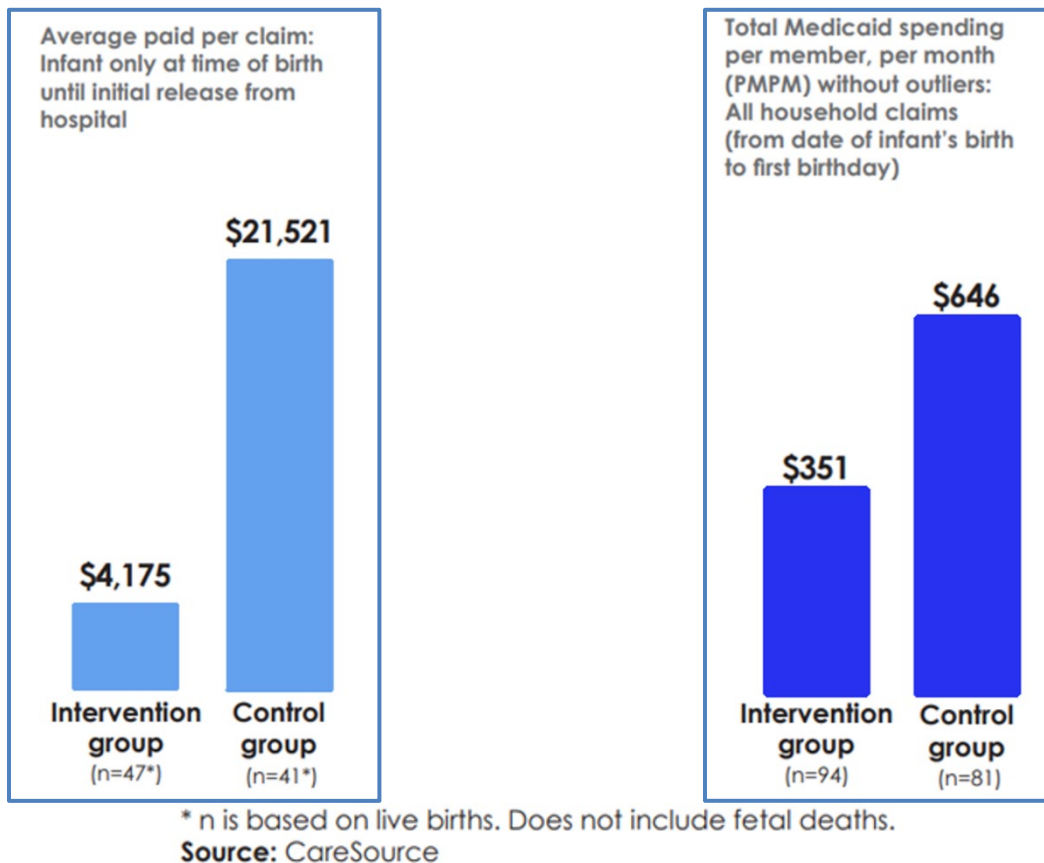


Figure 4: Medicaid Spending for HBAH Intervention and Control Groups [23]

Accessible Text Version: Chart on left shows average paid per claim for infant only at time of birth until initial release from hospital in the intervention group (n=47) as compared to control group (n=41). The sample sizes do not include fetal deaths. In the intervention group for HBAH, average claim was \$4,175 compared to \$21,521 for the control group. The right chart shows total average medicaid spending per member per month without outliers for all household claims from infant birth until the infant's first birthday, Average spending was \$351 in the intervention group (n=94) compared to \$646 in the control group (n=81).

If the HBAH program is expanded statewide in the future, including HMIS data and clinical Medicaid data collected under HBAH in the OHSDW would be beneficial. This would improve program data reporting for analyses of cost savings accrued and health outcomes for mothers and babies. Interviewees reported that early conversations with federal Medicaid representatives have included whether Ohio Medicaid could support housing costs if the HBAH program continues to show positive outcomes. Other states have initiated pilot programs to use Medicaid funding for housing costs when associated health outcomes provide supporting evidence.

3.6 Challenges and Lessons Learned

Ohio's experience with integrating housing data into the state data warehouse was challenging and has culminated in lessons learned. Table 2 details the challenges and lessons learned that may be useful for states considering implementing a state data warehouse.

Table 2: HMIS Data Integration and Use: Challenges and Lessons Learned

Challenge	Description From Case Study	Lessons Learned
CoC Participation	Having all CoCs represented on the OHSDW Steering Committee ensured ongoing communication with participating state agencies. Investing in and maintaining collaborative relationships with CoCs is imperative. This continued the conversation on data warehouse benefits and provided a forum to address CoC concerns about autonomy, client privacy, and HMIS reporting protocols.	Cultivating and maintaining a collaborative CoC relationship is crucial for HMIS data warehouse integration. Providing CoC HMIS data to a state data warehouse is voluntary. CoCs are a critically needed partner and must invest the time and resources needed for solution-oriented discussions about the benefits, roadblocks, procedures, and policies of incorporating HMIS data.
Disparate HMIS Data Management Systems	CoCs are independent entities and not all Ohio CoCs use the same HMIS reporting system. To address and ensure statewide CoC data compatibility, the OHFA data format is aligned with the HUD csv data export format required by all CoC HMIS systems. While HUD data does not contain detailed information on PEH, this is an alternative solution to reduce technical issues when having all CoCs use a unified reporting system isn't feasible or desired.	States considering adding HMIS data into a warehouse should assess the compatibility of existing reporting systems used by their CoCs. All participating CoCs should consider moving to one HMIS data system as a first step before trying to integrate statewide housing data into a data warehouse. If a unified system is not feasible, states should consider alternative approaches, such as Ohio's decision to use the HUD csv data export format.
Funding	Incorporating HMIS data into the OHSDW was complicated by technical issues. The COHHIO advocated for state funding to assist in replacing or upgrading incompatible CoC reporting systems and received funding from multiple state agencies [24].	The cost of system upgrades or replacement, along with other technical requirements must be considered during the planning process for warehouse development. Explore funding avenues to offset these costs.

Challenge	Description From Case Study	Lessons Learned
Staffing	In Ohio, warehouse management is one of several duties assigned to the data warehouse steward. Staffing turnover can impact warehouse management, use, and promotion. Adequate staff support at CoCs and the other state agencies is also key to successfully integrating and continuing to transmit data into a warehouse.	States and CoCs should budget for and provide adequate staff for optimal data warehouse performance and utilization. Plan for staff cross-training to allow redundancy and avoid disruptions to warehouse operations and communication channels as a result of staff turnover.
Data Sharing	Ohio has several challenges regarding data sharing. CoCs have different privacy requirements and restrictions that impact data use across systems. Competition for HUD funding affects Ohio’s ability to use data to inform statewide programs and interventions. There are strict data sharing policies developed by the Steering Committee, which is primarily comprised of CoC representatives, that often prohibit sharing data between CoCs and other agencies. This limits the extent that the data can be used in real-time situations such as case management or client tracking. Difficulty in accessing comprehensive data limits the state’s ability to address homelessness issues in a holistic manner.	The effective use of a warehouse depends on CoC participation and trust in the data warehouse. Robust privacy policies are critical but should not be so cumbersome as to discourage and impede data sharing among state agencies and participating community organizations. While the current OHSDW data privacy approach limits the use of data, revisiting data sharing and privacy policies should result in increased utility of data.
Data Privacy	Developing policies and procedures to protect client data was a crucial component of HMIS data integration in Ohio. A primary concern was the protection of client data from misuse and/or discrimination due to data breaches and inappropriate access. Ohio invested significant time in ensuring thoughtful development of OHSDW privacy policies and client data safeguards. Data policies developed by the OHSDW Steering Committee addressed data privacy concerns on multiple levels. Ohio uses multiple privacy layers and protocols including HIPAA standards, Steering Committee review and approval, data hashing, and inter-agency agreements.	Data privacy concerns are of the utmost importance when working with sensitive client data.

Challenge	Description From Case Study	Lessons Learned
Data Linking	Linking client data within and between databases is complicated by incomplete data. It is important to develop a process to identify client records across datasets. Ohio uses a hashing system to identify, clean, deduplicate, and merge client records. In Ohio, the hash system uses first name, last name, DOB, SSN, and gender to create the hash.	A systematic approach is needed to avoid duplicate records. Depending on the types of data available, states could consider use of an algorithm for matching or use a system such as hashing to create a unique identifier with multiple data points to match and reconcile client data.
State Agency Participation	A state data warehouse provides the ability to connect multiple state agency datasets to provide deep insight on shared populations served by the agencies. The participation of state-level agencies on warehouse committees and/or advisory councils is key in communicating the direct benefits of data integration, lessons learned, and best practices. At present, three Ohio state agencies sit on the OHSDW Steering Committee.	To avoid missed opportunities for greater participation, create a state-level advisory organization with CoC and multiple state agency representation to champion the benefits of a data warehouse and the use of robust data to help advise on homelessness programs and policies. A larger number of agencies sitting on a state-level data warehouse Steering Committee or advisory organization could facilitate the inclusion of data from other state agencies and result in more robust data.
Public Presence	The OHSDW website is accessible, user friendly, and comprehensive. The website provides information about the Steering Committee, warehouse policies and procedures, frequently asked questions, an informational brochure, reports, contact information for partner agencies and CoCs, and additional resource links.	A well-designed, informational website provides education on warehouse goals and increases transparency for a better understanding of its use, which bolsters confidence in and support for partnerships. Create and maintain a robust state data warehouse website to educate and inform partners, policy makers, residents, and interested members of the public.

Challenge	Description From Case Study	Lessons Learned
Policy Impact and Engagement of Key Leaders	<p>Two key Ohio examples demonstrate the power of data for leadership engagement, policy decisions, and state planning:</p> <p>When OHFA released the first report on an analysis of comprehensive OHSDW data from 2012–2017, they found that families with young children were one of the fastest growing populations impacted by homelessness [13]. Based on this finding, the governor implemented an innovative solution to provide housing for families with young children experiencing homeless and those at at-risk by redirecting excess federal funds.</p> <p>Additionally, a Cuyahoga County pilot study matched data to look at shelter, behavioral health, and criminal justice trends with the intent to improve existing policies, services, and resource allocation. The pilot led to the development of innovative programs to better serve the incarcerated population.</p>	<p>State data warehouses can be a powerful tool to provide data that informs policy decisions to address the root causes of homelessness and help support individuals experiencing homelessness. Data allows policy makers and program managers to make data-informed and cost-effective decisions.</p>
Data Quality	<p>The quality and completeness of partner data impacts how useful it will be when added to a state data warehouse.</p>	<p>Before importing new data sets into a state data warehouse, ensure data are accurate and complete. Plan for additional resources for quality assurance, data extracts, and migration.</p>

4 Summary

Data warehouses can take years, potentially decades to fully develop. The OHSDW is relatively new and is continuing to evolve. Many of the challenges and lessons learned cited in this case study can be attributed to the newness of the warehouse effort, a need for adequate staff to support the warehouse, and perceived barriers to data sharing.

One of the challenges in building a data warehouse is obtaining trust and buy-in from partners with data that could enrich the data warehouse. Robust partnerships require trust-building through multiple positive interactions over time. Partners need to understand how their data can contribute and why it's important to include it in a state data warehouse. Additionally, managing a data warehouse is a time-consuming endeavor. It requires adequate staffing to ensure data completeness, validity, and reliability. Only then can data be analyzed and synthesized to produce robust reports for government and community use in addressing homelessness. States that want to develop a data warehouse should plan for adequate staff and resources for data management at both the state agency and CoC level.

Data governance is managed by the OHSDW Steering Committee and is highly effective in safeguarding client privacy, but the processes required to access data may be perceived as cumbersome and intimidating by internal and external partners. Furthermore, the Steering Committee is largely composed of CoC representatives and two state agencies. The robustness of data may benefit from involvement of additional state agencies with missions related to homelessness and health. In addition, there is not currently representation of people with lived experience of homelessness or housing instability; inclusion of some individuals with these experiences could enhance the equity and inclusion of this important effort. Overall, a more diverse committee with additional state agency and community representation may enhance opportunities for data sharing and could drive further development of the warehouse and increase awareness of its utility.

When considering the lessons learned that are outlined in this case study, emphasis must be placed on the two primary factors for the OHSDW's successful incorporation of HMIS data: garnering the participation of all state CoCs and the OHFA staff had the necessary skills to incorporate data from diverse HMIS reporting systems.

Ohio created the OHSDW to link and share statewide data on services for PEH and those at-risk to address access issues that drive poverty and homelessness through planning and policy action [1]. Ohio has effectively used the data warehouse to understand the population's needs and leverage state resources to implement programs to address homelessness. Ohio should continue to recruit additional data partners to grow the OHSDW. Richer data will further an understanding of how to better serve PEH through focused interventions to reduce homelessness and poverty. As the warehouse evolves, effective interventions based on sound data will garner trust in and prove the value and utility of the warehouse.

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Appendix A Key Informant Interview Questions

MITRE developed a series of interview questions to provide general direction in conducting the state administrator interviews. These are designed to be a resource to facilitate conversation with the opportunity to pursue conversational threads of interest.

Interview Guide 1

Ohio Data Warehouse Case Study Interview Questions

Intended Respondent Roles: State Administrator

1. When did the OH Mental Health and Addiction Services incorporate data into the warehouse?
2. What type of data do you send to the warehouse?
3. What challenges were encountered/overcome during planning for data integration (e.g., privacy, technology, political)?
4. Can you describe some past and current collaborations to share/link data with other departments/agencies and how the collaboration afforded by data sharing (hopefully, specifically by the OHSDW) benefited? (Such as the Community Linkage program/Prison pre-release program, State Opioid Response program, addiction treatment, the new Access to Wellness Program, etc.)
5. What is your department's relationship with Ohio Recovery Housing, do you make referrals, track clients, etc.
6. What are some of the public health impacts that have been achieved by OhioMHAS with the ability to match and explore (client) data?
7. How is the matched data shared and received by OhioMHAS?
8. Is a Master Person Index (MPI) used for data matching and what identifiers are used?
9. Have there been any issues with the use of these identifiers?
10. Do you have any recommendations and lessons learned about the quality and usefulness of the matching data process for programming?
11. What are your future plans for collaboration using the data warehouse?
12. Do you have any questions for us?

Interview Guide 2

Ohio Data Warehouse Case Study Interview Questions

Intended Respondent Roles: State Administrator, Governance Oversight

1. What was/is your role in the creation/maintenance of the data warehouse?
2. What was the original reason for implementing the warehouse?
3. How long was the planning and implementation process for the warehouse creation? (When was the data warehouse implemented)?
4. What challenges were encountered/overcome during planning for data integration (e.g., privacy, technology, political)?

5. How was it determined what data to integrate first?
6. How was it determined that OHFA would store/manage the data warehouse?
7. How is the database structured and how is data received and shared?
8. What data is currently integrated?
9. Are there plans for additional agency data integration?
10. Who are your strongest collaborators and how did you initiate those collaborations?
11. What best practices would you recommend for implementing and maintaining a statewide data warehouse (e.g., collaboration, technology approach, data quality processes)?
12. What are your recommendations and lessons learned on metrics to monitor and evaluate data quality and usefulness of data in the warehouse?
13. What is the value of the data warehouse in addressing homelessness (i.e., the Stepping Up program)?
14. Are any public health partners sharing data in OHSDW or requesting to utilize OHSDW data? Have there been any public health impacts (e.g., what public health questions can now be addressed because multiple, disparate data sources are housed in a single repository? Improvements in public health outcomes?)
15. Has research been conducted using the data?
 - a. If yes: What goals/issues were addressed through research?
 - b. If no: Are there any plans to conduct research in the future?
16. Have there been any policy changes or new policies resulting from information/data provided in the warehouse?
17. What are the Future plans for the use of PEH/Public Health data in the warehouse?
18. Do you have any questions for us?

Interview Guide 3

Ohio Data Warehouse Case Study Interview Questions

Intended Respondent Roles: Community or Agency Data Warehouse Team Member

1. What were/are the motivating factors for implementing the Healthy Beginnings at Home program?
2. What are the goals of the program?
3. Who are you collaborating with and how did you initiate these collaborations?
4. Was HMIS data integrated with public health data to identify individuals for the program?
5. How is the matched data shared?
6. What challenges were encountered/overcome during planning for data matching?
7. Do you have data integration workflows, a research plan, or other documentation you might be able to share with us about the program?
8. What demographic and geographic data are included in the program analyses?
9. Can you describe more about if/how study results have impacted future funding?

10. Are you tracking longitudinal health outcomes data for the pregnant women and babies enrolled in HBAH?
11. Are HBAH and Celebrate One interconnected? If so, how?
12. Do you have any recommendations and lessons learned about evaluating the quality and usefulness of the matching data process?
13. Are there discussions/plans for Health and Human Service data to be linked with the HMIS data?
14. Do you have any questions for us?

Interview Guide 4

Ohio Data Warehouse Case Study Interview Questions

Intended Respondent Roles: Community or Agency Representative

1. What was/is your role in the creation/maintenance of the data warehouse?
2. When was the data warehouse implemented?
3. Why did OH decide to implement the warehouse?
4. What challenges were encountered/overcome during planning for data integration (e.g., privacy, technology, political)?
5. How is the database structured and how is information received and shared?
6. What best practices would you recommend on implementing and maintaining a statewide data warehouse (e.g., collaboration, technology approach, data quality processes)?
7. What are your recommendations and lessons learned on metrics to monitor and evaluate data quality and usefulness of data in the warehouse?
8. Who did you collaborate with and how did you initiate those collaborations?
9. What additional data will be integrated?
10. Regarding the HBAH program and its planned expansions, can you talk about how the data warehouse can be used for that program, future plans for its use?
11. Are there plans to use the warehouse for future programs to address the needs of PEH?
12. What is the value of the data warehouse in addressing homelessness?
13. Have there been any public health impacts (e.g., what public health questions can now be addressed because multiple, disparate data sources are housed in a single repository? Improvements in public health outcomes?)
14. Has research been conducted using the data?
 - a. If yes: What goals/ issues were/will be addressed through research?
15. Future plans?
16. Do you have any questions for us?

Interview Guide 5

Ohio Data Warehouse Case Study Interview Questions

Intended Respondent Roles: Data Warehouse Project Team Members

1. What were the motivating factors for implementing the Stepping Up Initiative?
2. What goals/issues are being addressed through the initiative?
3. Who are you collaborating with and how did you initiate these collaborations?
4. Is the Stepping Up initiative related to the Returning Home Ohio and the Home for Good programs?
5. If so, in what ways?
6. What challenges were encountered/overcome during planning for data integration (e.g., privacy, technology, political)?
7. Was HMIS data integrated with law enforcement data to identify individuals for the program?
8. How is the matched data shared and received?
9. Do you have program results, a research plan, or other documentation you might be able to share with us about the initiative?
10. What demographic and geographic data are included in the analyses?
11. Are there plans to expand the initiative to all Ohio counties?
12. Can you tell us more about the Stepping Up Strategy Lab?
13. Are you collaborating with any public health or other partners to share data with the intent of better serving PEH?
14. Do you have any recommendations and lessons learned about the data matching and program implementation process?
15. Do you have any questions for us?

Appendix B Methodology

CDC considered states for this case study that were identified through internet research as either in the process of incorporating HMIS data into a state data warehouse or that had completed the integration process. Ohio was one of five states under consideration based on initial research results. To inform the selection process, a review of official state websites for HMIS, regional CoC planning bodies, and housing, health and human services agencies was conducted to understand each state's progress on integration and utilization of HMIS data. Existing literature and reports reviewed for the various states under consideration included press releases, program announcements and updates, annual homelessness state reports, and strategic plans to provide the basis for understanding each state's efforts.

Ohio was selected because HMIS data integration was completed in 2016-2017. While Ohio did not have the benefit of a statewide, consolidated HMIS reporting system prior to integrating data in the state data warehouse, they succeeded in consolidating data from diverse HMIS reporting systems. Another factor that influenced the selection of the state was the comprehensive information, program reports, resources, links, and partner information readily available for the Ohio data warehouse.

Initial key informants were identified through an internet search of state and community representatives with firsthand knowledge of the Ohio data warehouse and HMIS integration. Additional key informants were identified by initial informant interviews. In total, interviews were conducted with seven informants representing the OHFA, OhioMHAS, COHHIO and the Cleveland/Cuyahoga Office of Homeless Services.

Interview questions were developed to capture topics outlined as areas of interest by CDC. The interview questions were tailored to each informant based on their expertise and those topic areas they could best address. The interview questions for each session are included in Appendix A. Interviews were conducted virtually with an interviewer and a notetaker. They were recorded and transcribed with permission to ensure capture of information. Individual informants participated in structured interviews to answer questions about the state data warehouse implementation, user policies, and research capabilities. Additional questions focused on service provision and public health prevention and intervention activities conducted to improve social, health, and public health services for PEH by using the state data warehouse repository.

To ensure that the information in the case study report is complete and accurate, each informant received a draft of the report via email for a two-week review period. This report incorporates all information and feedback provided by informants.

Appendix C Acronyms

Term	Definition	Description
BOS	Balance of State	A Continuum of Care that encompasses more than one county and is comprised of state regions without the resources to create their own continuum.
CDC	Centers for Disease Control and Prevention	Federal agency conducting the case study to identify public health impacts from implementing state data warehouses.
CoC(s)	Continuum(s) of Care	Local organizations mandated by HUD to provide planning and coordination for housing services and funding.
COHHIO	Coalition on Homelessness and Housing in Ohio	Non-profit organization that manages the Balance of State CoC (that covers all rural areas not part of any other CoC).
COVID-19	Coronavirus Disease 2019	A highly contagious respiratory disease caused by the SARS-CoV-2 virus.
DOB	Date of Birth	The day that a person was born.
HBAH	Healthy Beginnings at Home	Ohio research program focused on providing housing for pregnant women to study the effect on the child's health at birth.
HIPAA	Health Insurance Portability and Accountability Act of 1996	Federal law that requires organizations to protect sensitive patient health information from being disclosed.
HMIS	Homeless Management Information System	A system that follows HUD's standards for capturing data on PEH.
HNHF	Housing Now for Homeless Families	A local Ohio program that provides assistance to families with children under two years old.
HUD	U.S. Department of Housing and Urban Development	The federal agency that grants funding for local organizations to shelter and support PEH.
IT	Information Technology	A term used to encompass systems, data, and exchanges between systems (e.g., HMIS and OHSDW).
OHFA	Ohio Housing Finance Agency	The state agency that oversees the OHSDW including operations and maintenance.

Term	Definition	Description
OhioMHAS	Ohio Department of Mental Health and Addiction Services	A state agency that utilizes the OHSDW to inform their programs.
OHSDW	Ohio Human Services Data Warehouse	The data warehouse created by the state that stores HMIS data for the entire state for analysis.
PEH	People Experiencing Homelessness	A person that is either unsheltered (e.g., staying in a park) or not stably housed (e.g., couch surfing or in a shelter).
PII	Personal Identifying Information	Any data that can be used to identify a specific individual (e.g., name, social security number, address).
PPRL	Privacy Preserving Record Linkage	A means of connecting records across multiple systems securely through different methods such as data hashing.
SAMHSA	Substance Abuse and Mental Health Services Administration	The agency within the U.S. Department of Health and Human Services that leads public health efforts to advance the behavioral health of the nation.
SDOH	Social Determinants of Health	A term used to cover factors that are not health specific, but can still impact health outcomes (i.e., homelessness).
SPMI	Severe and Persistent Mental Illness	A group of severe mental health disorders that are prolonged and recurrent, impair activities of daily living, and require long-term treatment.
SSN	Social Security Number	A unique number assigned to all U.S. citizens by the Internal Revenue Service that is used to identify them.
SUD	Substance Use Disorder	A treatable mental disorder that affects a person's brain and behavior, leading to their inability to control their use of substances like drugs or alcohol.
TANF	Temporary Assistance for Needy Families	Provides states with funding to operate programs designed to help low-income families with children achieve economic self-sufficiency.