



# Assessment and Mapping of Community Connections in Home Visiting

## *Final Report*

OPRE Report #2019-68



# Assessment and Mapping of Community Connections in Home Visiting: Final Report

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Kristina Rosinsky, Rebecca Madill, Stacey Bashara, Lauren Supplee, Sara Shaw, Randy Stearns, Winnie Li, Tim Gutowski, Emily Cantrell

## Submitted to:

Office of Planning, Research, and Evaluation

Administration for Children and Families, U.S. Department of Health and Human Services

Project Officers: Amanda Clincy Coleman, Pooja Gupta, and Nancy Margie (OPRE)

Other Federal Staff: Kyle Peplinski and Alisya Oetoyo (HRSA)

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## Submitted by:

Child Trends

7315 Wisconsin Ave., Suite 1200W, Bethesda, MD 20814

Project Director: Kristina Rosinsky

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## A. Overview

### A. 1. Introduction and purpose

Home visiting programs provide information and support to parents of young children to address their individual needs. The families served by home visiting programs often have many needs, and home visitors cannot address all of them. Therefore, referrals to outside community services are vital for the success of the families that home visiting programs serve.

Recognizing the importance of these referrals, the Administration for Children and Families (ACF), in partnership with the Health Resources and Services Administration (HRSA), both of the U.S. Department of Health and Human Services (HHS), contracted with Child Trends and Trilogy Interactive to design a prototype for a tool to enhance home visiting stakeholders' understanding of community connections in the home visiting context. Stakeholders of interest included federal staff, state administrators, tribal and non-tribal local implementing agencies (LIAs), state-level early childhood coordinators, technical assistance providers, home visiting model and tool developers, and researchers. Community connections refers to relationships between home visiting programs and other community services providers, such as those offering mental health services, child care, and more. This report provides a summary of the work the project team completed to understand the needs of relevant stakeholders and to propose a tool that would meet their needs.

### A. 2. Methodology

To create a prototype of the tool, the project used a human-centered design approach. The project team relied heavily on input from stakeholders to deeply understand their needs. By engaging a stakeholder group that included potential end users of the tool (i.e., federal staff, state administrators, and LIAs) throughout the project, the team learned that stakeholders were interested in the availability of community service providers, gaps between family needs and availability of services, the accessibility of providers (in terms of location, language, and more), quality of services, and much more. Based on this information from stakeholders, as well as findings from other project activities, the team developed several iterations of the prototype. The result was a final prototype of a tool that would help stakeholders better understand community connections between home visiting programs and other community service providers.

### A. 3. Key findings and highlights

This report shares several reflections on what the team learned through the project activities. The key reflections are:

- Making referrals from home visiting to other community services is a complex process. Home visitors must understand (1) the availability, accessibility, and relationships between home visiting programs and community resources, (2) the families' needs, and (3) appropriate ways to connect families to resources that align with their needs within the unique local context. This information informed the development of the prototype by highlighting the key information programs need that a tool could provide.

- Stakeholders want a great deal of information about community connections in the home visiting context, including the supply of and demand for community services and the accessibility of these services at the LIA, state, and national levels. However, due to data limitations, the prototype of the tool does not address several identified needs.
- Basic analyses, as opposed to complex analyses, were more appropriate for this project. One of HHS's original goals for the project was to better understand the strength of connections between home visiting programs and various community resources. The project team considered addressing this goal through complex analytic techniques such as social network analysis. However, stakeholders showed a preference for information that could be derived from basic descriptive analyses.

#### A. 4. Glossary

ACF: Administration for Children and Families

HCD: Human-Centered Design

HHS: U.S. Department of Health and Human Services

HRSA: Health Resources and Services Administration

LIA: Local Implementing Agency

MIECHV: Maternal, Infant, and Early Childhood Home Visiting Program

MVP: Minimum Viable Product

OMB: Office of Management and Budget

TA: Technical assistance

SAMHSA: Substance Abuse and Mental Health Services Administration

SNA: Social network analysis

## B. Executive Summary

### B. 1. Introduction

Home visiting programs provide information and support to parents of young children to address their individual needs. These programs focus on promoting positive parent-child relationships and optimal parent and child development. The families served by home visiting programs often have many needs, and home visitors cannot address all of them. To accomplish their goals for families, home visitors need to be adept at screening families to identify concerns and able to link them to available community resources.

Past research has found that home visiting is better able to achieve its goals when there are community services to support families' needs (Rubin et al, 2011). Underscoring the importance of referrals to community resources, the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program, which provides grants to support evidence-based early childhood home visiting, emphasizes the formation of partnerships between home visiting awardees and other health and human services, such as early care and education and child welfare programs. However, many home visitors struggle with identifying service providers and ensuring those providers are accessible to the family (e.g., in terms of location, languages spoken, and more) and that the providers meet the need for which the referral was made. Further, state and federal administrators require information about the needs of the community and availability and accessibility of service providers to better support home visiting programs. In fact, the statute that authorizes the program requires MIECHV awardees to report on coordination and referrals as one of the benchmark areas for the MIECHV Program.

Given the key role of these referrals for positive parent and child outcomes, the Administration for Children and Families (ACF), in partnership with the Health Resources and Services Administration (HRSA), both of the U.S. Department of Health and Human Services (HHS), contracted with Child Trends and Trilogy Interactive in 2017 to design a prototype for a tool that would meet the needs of stakeholders to better understand community connections or relationships between home visiting programs and other community services providers. ACF and HRSA intended for the tool to focus specifically on referrals from home visiting programs to other community services and meet the needs of many home visiting stakeholders (federal staff, state administrators, tribal and non-tribal local implementing agencies (LIAs), state-level early childhood coordinators, technical assistance providers, home visiting model and tool developers, and researchers).

The project used human-centered design (HCD) as a guiding principle for this work. HCD approaches seek to examine a problem in depth to identify the root causes of an issue so that the proposed solution deeply satisfies the people who are grappling with the problem. This approach allowed the project to design a tool with the end user in mind at every step.

## B. 2. Methodology

To understand stakeholder needs and design a prototype for a tool that leverages the best available approaches, technologies, and data sources to support those needs, the project team conducted the following activities:

**Stakeholder engagement.** Stakeholder engagement was an integral component of the project, particularly because the project used an HCD approach to develop the proposed tool. To conduct this work, the team first identified a stakeholder group composed of individuals working in the home visiting context, including state and federal home visiting administrators, tribal and non-tribal LIAs, which are organizations that provide home visiting services to a community, and many other home visiting stakeholders of varying roles and from diverse geographic locations. The team then held an initial stakeholder engagement meeting with this group to introduce members to the project, discuss the role of the stakeholder group, and collect information about the problems or needs a tool could address. After working with federal stakeholders and project consultants to develop a preliminary set of questions of interest that the tool should address, the team then held focus groups with stakeholders to develop **user personas** (descriptions of the kinds of users the proposed tool would serve), rework the questions of interest into a final set of **user stories** (narrative descriptions of what users want the tool to do), and gather feedback on prototypes of the proposed tool. In addition, the team held one-on-one conversations with stakeholders about issues that arose during the project (e.g., to inquire about possible data sources with which to populate the tool).

Through these activities, the team learned that stakeholders wanted a tool to help them identify the availability and accessibility (i.e., hours of operation, location, languages spoken) of service providers; where there may be gaps between community needs and providers; what factors determine whether families make initial contact with, and continue to receive services from, the community resources to which they were referred; and more.

**Scan of the field.** To complement stakeholder insights, the project team conducted a scan of the field to identify approaches, methodologies, and technologies that are currently being developed or used to understand community connections in areas such as early care and education, child welfare, domestic violence, substance abuse, and health care services. The team completed the scan of the field in two phases: (1) identifying relevant approaches/methodologies, and (2) identifying relevant technologies. Several resources provided information on defining and measuring key concepts such as the availability and accessibility of services, and provided best practices related to data visualizations and mapping tools.

**Logic model development.** The project team developed a logic model to fully understand the key inputs, activities, and outcomes relevant to coordinating resources and referrals in home visiting. The logic model informed the development of the web-based tool by drawing attention to the key inputs and processes that a tool could help facilitate. The team produced a three-part logic model to explain (1) the development and maintenance of a network of community resources, (2) assessment of families' needs, and (3) the connection of families to needed community services.

**Exploration of data sources.** The project team identified existing data sources that could address the user stories that stakeholders developed. For example, 2-1-1 websites were identified as a source of provider information needed to address this user story: *As a social justice advocate, I would like to see where all the service providers in my region are located so I can advocate for greater coverage.* For each user story, the team identified the types and recommended sources of data needed. For each recommended data source, the team described how those data could be obtained. For some sources, such as 2-1-1 websites, this included writing code to automatically pull data from a website in an efficient manner. In many cases, it was necessary to set aside user stories due to the unavailability of data or the difficulty in obtaining or maintaining required data.

Ultimately, the project team recommends the use of 2-1-1 websites, Substance Abuse and Mental Health Services Administration (SAMHSA) data on providers, an index that measures neighborhood disadvantage, U.S. Census data, Google Maps, LIA-level data collected by MIECHV state awardees to complete HRSA performance measure forms, and various publicly available data sources described in HRSA's guidelines for state needs assessments.

**Analysis plan development.** The team then developed an analysis plan to describe how the tool could address each feasible user story by displaying and analyzing various data sources.

**Prototyping.** Finally, the team produced several iterations of prototypes of the proposed tool and presented some for stakeholder feedback. These prototypes were an inexpensive way to test approaches and identify any problems early. This report presents the final prototype for the proposed tool.

### B. 3. Proposed tool

Through this work, the team developed a prototype of a tool that will help stakeholders better understand community connections between home visiting programs and other community service providers. In particular, the proposed tool would enable a stakeholder to better understand the availability and accessibility of service providers, and where there may be gaps between community needs and providers.

The proposed tool as portrayed in the final prototype includes two ways to view data: a mapping function and a report function. The mapping function allows users to see data (e.g., provider locations) visually plotted on a map. The map has features that give the user important context about an area served by a home visiting program (e.g., the level of disadvantage in a neighborhood, and whether there are areas without a provider within a given drive time). It also allows users to filter displayed providers by service type (e.g., mental health services, substance abuse treatment). Users can click on a provider name displayed on the map for details about the program services, hours of operation, contact information, and more. Information about providers that appear on a user-generated map can be

printed in a list format or downloaded. These user-generated maps can also be shared via a link created by the system or saved to the user's account for future reference.

In addition to the mapping feature, the proposed tool allows users to generate reports. Examples of reports users may generate include:

- **Area overview:** provides information about the number of service providers, the families served, and contextual information about a given area (national, state/territory/tribal area, or LIA).
- **Supply and demand:** compares statistics on providers and referrals to reveal gaps between available providers and the needs of the clients in the LIA and/or the needs of residents in the county.
- **Service accessibility:** provides information about the accessibility of providers in a given area (national, state/territory/tribal area, or LIA) such as the percent of neighborhoods in an area that have a provider within a reasonable driving distance.

Each of these reports can be generated for a single area, for more than one area for geographic comparisons, and for one area over time. Reports, like maps, can be shared with others via a link or saved to the user's account. The appendices provide recommendations for implementing this tool and technical specifications.

#### B. 4. Limitations and possible future directions

Several needs identified through user stories were set aside because of data limitations. For example, many of the user stories required home visiting administrative data that exist (such as the number of referrals to community service providers and results from client screeners). However, these data are not uniformly gathered by every model or MIECHV LIA or gathered in an easily accessible format, so it is difficult to aggregate and analyze the information consistently in and across all locations. In other cases, user stories required data that do not currently exist, such as the capacity and quality of service providers. This section of the report presents several ideas for how to overcome some of these challenges in the future. For example, additional work could be done to better understand the data about available community service providers such as meeting with 2-1-1 staff to better understand how comprehensive their listings are. Future work on the prototype could further explore crowdsourcing (i.e., letting users add or edit data) as a potential data source. Finally, data exchange standards for home visiting may allow for the ability to share existing data across LIAs and models.

#### B. 5. Reflections

This report presents several reflections based on what the project team learned through the above activities:

**Making referrals in home visiting is a complex process.** Through this project, the team found that the process to make referrals in the home visiting context requires that home visitors understand (1) the availability, accessibility, and relationships between home visiting programs and community resources,

(2) the families' needs, and (3) appropriate ways to connect families to resources that align with their needs within the unique local context. These factors show that there are multiple elements at play related to referral-making in home visiting. This information informed the development of the prototype by highlighting the key information that programs need and a tool could provide.

**Stakeholders want more information about community connections in the home visiting context.** The user stories indicate stakeholders are interested in learning more about both the supply of and demand for community services, as well as the accessibility of these services at the LIA, state, and national levels. Furthermore, stakeholders would like to learn about how these metrics of accessibility change over time, so they can more effectively target services and track their progress toward their goals.

**A shift from complex analyses to more basic analyses.** One of HHS's original goals for the project was to better understand the strength of connections between various community resources. Therefore, HHS requested that the tool incorporate sophisticated analyses such as geomapping, social network analysis, and spatial discrete choice models. Most user stories, however, were more appropriately addressed using basic descriptive analyses and visualizations. The project team determined that stakeholders' interests could be answered primarily through a map interface, with summaries of key indices provided in reports.

#### **Definitions of Analytic Strategies**

**Geomapping** is the layering of data on a map to visually understand an issue.

**Social network analysis** is used to understand the strength of connections within a network and how they change over time.

**Spatial discrete choice models** are used to describe, explain, and predict choices between two or more alternatives, such as why home visitors tend to make referrals to one provider over another.

## C. Introduction

Despite their many strengths, low-income families served by home visiting programs often face challenges that compromise their well-being (Michalopoulos et al, 2015). Home visiting programs can assist these families by providing skills, knowledge, and supports to parents of young children and promoting positive parent-child relationships and optimal parent and child development. Home visiting is a service delivery mechanism that reduces barriers to receiving support by having home visitors meet with individuals and families in their own homes.

Home visiting programs are offered in every state, permanently inhabited territory, and in many tribes, and they are supported through a range of funding (National Home Visiting Resource Center, 2018). One of the primary sources of financial support at the federal level is the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program, which was authorized in 2010 as part of the Patient Protection and Affordable Care Act and is administered by the Health Resources and Services Administration (HRSA), in partnership with the Administration for Children and Families (ACF). In fiscal year 2017, the MIECHV Program served approximately 156,000 parents across 50 states, the District of Columbia, five U.S. territories, and 25 tribal communities (National Home Visiting Resource Center, 2018; Health Resources and Services Administration, n.d.). The law requires the MIECHV Program to collect data on how grantees are achieving outcomes in six domains, including improved coordination and referral for other community resources and supports.

Beyond the supports home visitors provide directly, families enrolled in home visiting often need additional supports. These additional supports (e.g., housing, mental health services) fall outside the purview of the home visiting program itself and require referrals to other services in the community. Therefore, to accomplish their goals for families, home visitors need to be adept at screening families to identify concerns, and they must be able to link families to available community resources.<sup>1</sup>

Past research has found that home visiting is better able to achieve its goals when there are community services to support families' needs (Rubin et al., 2011). Recognizing the importance of referrals to community resources, the MIECHV Program emphasizes the formation of partnerships between home visiting program awardees and other health and human services organizations, such as early care and education and child welfare programs. In fact, MIECHV awardees must report performance measurement data to HRSA about the referrals they make for home visiting clients who have particular needs. However, many home visitors struggle with identifying service providers, ensuring those providers are accessible to the family (e.g., in terms of location, languages spoken, and more), and that the providers meet the need for which the referral was made. Further, state and federal administrators require information about the needs of the community and availability and accessibility of service providers to better support home visiting programs.

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<sup>1</sup> There are two kinds of referrals in home visiting. The first is referrals of families to home visiting programs, and the second is referrals of families enrolled in home visiting for needed services. Though both are important for the success of home visiting, the current project only focused on the latter.

Given the key role of referrals for needed services in the home visiting context, ACF, in partnership with HRSA, sought to develop a design for a tool that would enhance understanding of community connections in the home visiting context. ACF and HRSA were interested in promoting understanding of the availability of community service providers to which home visiting clients can be referred. ACF intended for the tool to meet the needs of many home visiting stakeholders (including state administrators, local implementing agencies [LIAs], federal staff, and others). ACF awarded this work to Child Trends, which subcontracted with Trilogy Interactive.

### C. 1. Guiding principle of the project: human-centered design

Rather than prescribe data or technology solutions to the challenges noted above at the outset and removed from the experiences of home visiting stakeholders, the project used a human-centered design (HCD) approach to discover the most usable, sustainable systems. Traditional design approaches center on identifying a solution to solve a problem. Consider the question: “If I ask you to build me a bridge, what would you do?” Following traditional approaches, one might begin by drawing up engineering specifications and ordering steel. But an HCD approach explores the problem at hand by probing: Why do we need to build a bridge? To cross a river. Why do we need to cross the river? To deliver a message. Well, then a bridge might not be the best solution (Tsai, Yang, & Huang, 2012).

HCD includes the idea of examining the problem in depth and identifying root causes of the issue. To truly understand the issue, HCD involves observing how people act and inquiring about their behaviors and motivators. This approach allows for stronger insight into the needs of individuals, which in turn fuels more responsive ideas. Properly practiced, HCD generates solutions that deeply satisfy the people who are grappling with the problem. In the case of getting a message across the river, email may have proven a more human-centered solution than building a bridge.

Successful HCD requires a process that is participatory, investigative, and collaborative. To facilitate this approach throughout this project, the team engaged a variety of stakeholders to ensure a thorough understanding of the issues at hand and a final proposed solution that was responsive to their needs.

For additional background about human-centered design, please see Norman (2013) and Giacomini (2014).

### C. 2. Structure of report

The first section of the report presents the methodology the project team used to build a prototype of a tool that would enhance the understanding of community connections in home visiting. The report describes the team’s efforts around engaging stakeholders, scanning the field for relevant resources and approaches, developing a logic model to facilitate deep understanding of the issue, identifying data sources, developing an analysis plan, and ultimately, building prototypes of the recommended tool.

The second section provides an overview of the proposed tool, including a summary of its features and functions. The appendices provide recommendations for implementing this tool and technical

specifications. The proposed tool presented in this report is only one potential approach for meeting stakeholder needs and is not endorsed by HHS.

The subsequent section presents information on the limitations of the proposed tool and ideas for how it can be enhanced in the future.

Finally, the report shares several reflections based on what the team learned through the process of engaging stakeholders around this topic. Reflections focus on the complexity of referrals in home visiting, what stakeholders want to know about referrals in this context, and the types of analyses needed to address stakeholder needs.

## D. Methodology

Over the course of the work to develop a prototype of a tool that will help stakeholders better understand community connections between home visiting programs and other community service providers, the team engaged in the following activities:

- Stakeholder engagement
- Scan of the field
- Logic model development
- Exploration of data sources
- Analysis plan development
- Prototyping

### D. 1. Stakeholder engagement

Stakeholder engagement was an integral component of the project. Feedback from frequent and ongoing stakeholder engagement activities informed all aspects of the work. The stakeholder meetings allowed the project team to learn from stakeholders about their experiences and their perceptions of current issues in the home visiting context. Stakeholders were also asked how a potential tool could improve coordination of resources and referrals. This work was essential, given ACF's interest in having the proposed tool meet the needs of many home visiting stakeholders (including state administrators, LIAs, federal staff, and others).

#### *D. 1. a. Identification of stakeholder group*

To identify stakeholders for the project, the team drafted a list of about two dozen experts and possible end users from across the field of home visiting and service coordination. The tool's targeted end users included state and federal home visiting administrators, and tribal and non-tribal LIAs (organizations that provide home visiting services to a community). Other stakeholders included state-level early childhood coordinators, technical assistance (TA) providers, home visiting model and tool developers, and researchers. The project team chose a variety of stakeholders (in terms of role, geography, and expertise) to capture the diverse perspectives of possible end users of the tool to be developed.

#### *D. 1. b. Goals of stakeholder engagement activities*

Throughout the project there were several stakeholder engagement activities. These included an initial stakeholder meeting, ad-hoc phone calls, interviews, and focus groups. These activities were designed to collect stakeholder feedback on several aspects of the project including:

- The initial logic model detailing the processes relevant to the coordination of resources and referrals in home visiting
- The needs and problems stakeholders face when facilitating community connections in home visiting and how a tool could help
- Possible data sources that could be used to address stakeholders' needs
- Prototypes of the final tool<sup>2</sup>

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<sup>2</sup> In addition to engaging stakeholders, the project team held a focus group with federal project officers at HRSA.

The project team largely conducted these stakeholder engagement activities by phone or via video conferencing.

#### *D. 1. c. Identification of preliminary questions of interest*

An early goal of the stakeholder engagement activities was to determine the questions of interest that a tool would ideally address. To develop a preliminary list of questions of interest, the team reviewed the project's Statement of Objectives (developed by ACF) and translated the project's overall goals into specific questions of interest to the federal government. Project consultants provided feedback on these preliminary questions of interest to ensure the questions addressed key issues currently facing researchers and practitioners in home visiting. Next, ACF and HRSA reviewed the questions of interest, and the project team used their feedback to develop the final list of preliminary questions of interest. The team used the preliminary questions of interest as a starting point for federal stakeholders' user stories (see Section D. 1. e. below).

#### *D. 1. d. Development of user personas*

The team conducted interviews with subgroups of stakeholders based on their role (e.g., state administrators, federal administrators, LIAs, etc.) to develop user personas (descriptions of the kinds of users who will use the tool) and user stories (narrative descriptions of common tasks users of the tool need to complete). The user personas and user stories formed the basis of the proposed tool's functional specifications.

To develop user personas, the team asked participants questions about their goals and challenges related to service coordination. Participants were also asked to respond based on their personal experiences, with the understanding that their responses would be aggregated to form the persona representing their group of end users. Descriptive details were captured in a user persona template, an instrument widely used in HCD projects. In total, three user personas were developed:



**Donna, state administrator:** She is responsible for overseeing quarterly reporting to HRSA and ensuring her grantees are meeting their benchmarks. She sometimes is asked to provide data for legislative requests. Donna attends quarterly Continuous Quality Improvement meetings with her team and reviews their progress, always on the lookout for "bright spots," or successes to share. She will soon implement Help Me Grow in her state, which will entail additions to her toolbox for monitoring and reporting.



**Charlotte, federal staff overseeing state, territory, and tribal programs:** She is responsible for all grant monitoring and meeting all MIECHV requirements. She is the point person to help her awardees be successful. Charlotte tries to check in with her awardees monthly, especially regarding the capacity of their LIAs. She relies on the Form 4 Quarterly Data Report that states submit for data about the number of families served and capacity of home visiting programs. Form 4 also helps her determine what awardees need and often sparks dialogue about their challenges. She is also charged with budgetary oversight for her awardees.



**Maria, LIA representative:** She meets monthly with network coalition members to share best practices. They are investigating creating a database to track referrals among these agencies. Maria tries to interpret data to inform her practice, but this is a challenge. She would like data on whether families are completing services; she has only client self-reports for now. Maria tries to keep up with services in her area, so she has the best contacts to connect families to, but these contacts continually change.

Please see Appendix A for a full description of each persona.

#### *D. 1. e. Development of user stories*

The project team then developed user stories written from a user's perspective. These user stories (narrative descriptions of common tasks users of the tool need to complete) are written in a formalized manner to ensure that prototype designers and developers who will build the eventual tool can easily understand users' needs. The format not only helps broadly define the tool's function, but also highlights where data sources may be missing, where stories may overlap or be at odds, and where other users may need to be consulted. The format is:

**As a <user type>, I want to <function>, so that <benefit>.**

To collect user stories for this project, the team invited stakeholders to virtual meetings. Throughout these meetings, the stakeholders preferred to speak naturally as opposed to forcing their user stories into the formal template. This practice is not uncommon, and the team molded stakeholders' comments to fit the user stories template after the meetings. See Appendix B for the full list of user stories generated. In summary, stakeholders were interested in:

- Data or information that would help identify or visualize the location of local community service providers
- Identifying the risk and protective factors of families in the community
- Gaps in a community between needs and availability of relevant service providers, and reasons for those gaps
- Information about the spatial (e.g., distance, commute) and operational (e.g., hours of operation, language) accessibility of service providers

- The ability to track referrals made from home visiting programs to other services to measure how many families successfully connect to providers and why some referrals are not successful
- Identifying features of relationships between home visiting programs and other service providers and whether those features impact the rate and success of referrals
- Real-time information about service providers, such as points of contact and current wait lists/availability
- Quality of and family satisfaction with service providers
- Information over time to identify trends
- A way to connect with others in their community to promote collaboration

Ultimately, there were several user stories that the project was not able to address in the final proposed tool for a variety of reasons. Appendix B includes information about whether each user story was retained, and if it was not, why it was not. The report discusses these limitations in further detail below.

## D. 2. Scan of the field

The project team conducted a scan of the literature in human-centered design, home visiting, and human services to identify approaches, methodologies, and technologies that are currently being developed or used to understand connections in areas such as early care and education, child welfare, domestic violence, substance abuse, and health care services. The team completed the scan of the field in two phases: (1) identifying relevant approaches/methodologies, and (2) identifying relevant technologies.

The scan of the field was conducted using a web-based search engine. Search terms were developed in advance to guide this task. The team reviewed the first five pages of search results for each term (10 results per page). Once the team collected all potentially relevant results, the results were narrowed down through an iterative process with review from multiple team members.

In addition to internal search activities, the team asked stakeholders to provide feedback to identify any gaps in the research and create the most comprehensive pool of information possible. The team shared the results of the scan of the field with the stakeholders via email and requested that they share any areas of research, service models, or specific resources missing from the initial search.

Findings from the scan of the field informed project activities and the development of the prototype. The findings were referenced throughout the life of the project to explore possible data sources and analyses for the proposed tool, as well as challenges and possible solutions for addressing user stories within the tool.

## D. 3. Logic model development

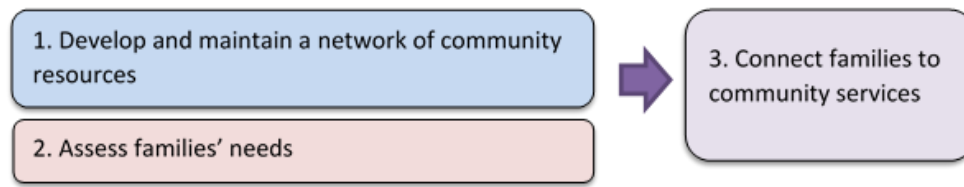
Next, the project team worked with stakeholders to develop a logic model to identify the key inputs, activities, and outcomes relevant to referral-making processes in home visiting programs. The team

identified three objectives of home visiting to be the focus of the logic model. These objectives follow the progression of steps related to referrals to services in home visiting:

- **Objective 1: Develop and maintain a network of community resources**
- **Objective 2: Assess families' needs**
- **Objective 3: Connect families to community services**

The project team created a separate logic model for each objective and linked them together as shown in Figure 1. Outputs from the first and second logic models form the foundation of the third logic model.

**Figure 1. Overview of the three-part logic model**



The final logic model is included in Appendix C.

The logic model informed subsequent project activities and formed an overall foundation for the project. In particular, the logic model informed the development of the web-based tool by drawing attention to key inputs and processes that a tool could help facilitate. For example, Part 1 of the logic model described the inputs necessary for developing and maintaining a network of community resources. Inputs ranged from aspects of the policy context that support network building (e.g., policies related to early childhood systems building) to the presence of physical resources in the community that serve families (e.g., services related to mental health, substance abuse, and material needs such as housing and food). Acknowledging that one tool cannot measure every possible input and still be well organized and frequently updated, the project team opted to focus the tool on inputs that reflected stakeholders' day-to-day needs. These tended to be physical resources as opposed to policy contexts.

#### D. 4. Exploration of data sources

As described above, the team engaged with a diverse group of stakeholders to compile user stories to inform decisions about necessary functionality within the proposed tool, and then reviewed this list of user stories to determine the types of data needed to address each story. For example, to address the user story, *"As a Tribal Technical Assistance Provider, I would like to be able to show my grantees a visual representation (like a map) of the resources close to them, so they can be prompted to contact service providers they might not normally default to,"* the following types of data would be needed:

- a list of all community service providers in an area
- the services offered by each community service provider
- the geographic boundaries of each LIA

After determining the types of data needed for every user story, the team identified one or more sources for each type of data. The data types were divided into two categories: publicly available data,

such as U.S. Census Bureau data; and administrative data, such as referral data from home visiting programs.

#### *D. 4. a. Publicly available data*

The project team aimed to use publicly available data as often as possible to eliminate or reduce the burden on LIAs. It was expected that publicly available data would be especially useful when addressing user stories about the availability of community service providers. For example, one user story reads, *“As a state administrator, I would like to be able to see whether substance-abuse disorder programs exist in areas where families in my state who need these services live.”*

The information the project team sought to obtain from publicly available data, and the sources that were considered, are presented in Table 1 below. An asterisk marks data sources that the team ultimately recommends for the proposed tool.

Two of the publicly available data sources the project team explored as sources for information about community service providers—2-1-1 and Google Places—required data to be pulled, or “scraped,” from websites using Python (a programming language) code.<sup>3</sup> 2-1-1 is a nationwide service supported by the United Way that includes information about community service providers (names of services providers, the kinds of services they provide, location, and more). Google Places captures information on local businesses, such as address and hours of operation, and includes community service providers as well as other businesses. To test the feasibility of this “scraping” process, the team used California as an example state because the project could efficiently examine data for the state awardee, counties with both urban and rural areas, and a tribal awardee. The team scraped 2-1-1 data from three counties in California (Los Angeles, San Bernardino, and Riverside), two of which intersect with a tribal area. This testing provided an opportunity to adapt the Python codes to different 2-1-1 websites and ensure that 2-1-1 data could be collected for service providers in various locations (i.e., counties and tribal areas).

When exploring data sources for lists of community service providers, the team sought sources that included providers from the following categories that are often used by home visiting clients, based on the project's Statement of Objectives and confirmed during conversations with stakeholders: (1) domestic violence services, (2) early care and education, (3) food support, (4) housing, (5) job-training programs, (6) mental health, (7) primary care, (8) substance abuse, and (9) transportation. Google Places and 2-1-1 both met this requirement. In addition, the data sources One Degree and Aunt Bertha (described in more detail below), which were only briefly considered due to their geographic and financial limitations, include providers from these service categories.

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<sup>3</sup> The United Way does not endorse the scraping of 2-1-1 data. However, United Way has indicated they are open to discussing sharing data with individuals if they reach out to 2-1-1 Worldwide.

**Table 1. Publicly Available Data Sources Considered**

Information Sought	Publicly Available Data Sources Considered
Number of employees at each community service provider	IRS 990 filings
Information about the safety of local areas	Data collected through the Uniform Crime Reporting (UCR) Program, provided by the U.S. Department of Justice, Federal Bureau of Investigation
Information about community service providers (name, location, services provided, phone number, website)	Substance Abuse and Mental Health Services Administration's (SAMHSA) facility locator map,* Google Places, state or county 2-1-1 websites*  Also considered, but in less detail due to cost or geographical limitations of the source: One Degree, Aunt Bertha
Index of neighborhood disadvantage	Area Deprivation Index at the U.S. Census block group level,* individual indicators from the U.S. Census at the tract level
Urbanicity of LIA service areas	U.S. Census data with the principal city (or cities) of metropolitan statistical areas (MSAs), to use in combination with geographic boundaries of MSAs and counties (see next bullet);* HRSA classification of counties as urban or rural
Geographic boundaries for mapping	Cartographic boundary KML (Keyhole Markup Language) files from the U.S. Census Bureau*
Transportation information (calculations of the distance between community service providers and public transit stops, and a drive-time radius around each community service provider)	Google Maps*
County risk indicators	Various data sources, as described in HRSA's guidelines for state needs assessments* (Sources include the U.S. Census Small Area Income and Poverty Estimates; Bureau of Labor Statistics; American Community Survey; National Vital Statistics System, Raw Natality File; SAMHSA, National Survey of Drug Use and Health; Inter-university Consortium for Political and Social Research, National Archive of Criminal Justice Data; data on child maltreatment collected by ACF)

#### D. 4. b. Administrative data

Next, the project team explored the availability of administrative data from LIAs, MIECHV state awardees, and HRSA. It was expected that administrative data would be especially useful when addressing user stories about client needs, including screeners and referrals. For example, one user story reads, *“As a state administrator, I would like to consider who gets referrals through a racial equity lens, so that I can build awareness of any disparities in service provision.”*

The information the team sought to obtain from administrative data, and the sources that were considered, are presented in Table 2 below. An asterisk marks data sources that the project team ultimately recommends for the proposed tool.

**Table 2. Administrative Data Sources Considered**

Information Sought	Administrative Data Sources Considered
Names and locations of all LIAs	HRSA’s official list of active LIAs*
Zip codes of clients	MIECHV state awardees (provide LIA-level data used to complete HRSA Form 4),* model developers’ administrative data, individual LIAs’ administrative data
Client demographics	MIECHV state awardees (provide LIA-level data used to complete HRSA Form 1),* model developers’ administrative data, individual LIAs’ administrative data
Memoranda of Understanding (MOUs)	Model developers’ administrative data, individual LIAs’ administrative data, crowdsourcing (i.e., tool users input data themselves)
Number of client referrals in each category (e.g., tobacco cessation)	MIECHV state awardees (provide LIA-level data used complete HRSA Form 2),* model developers’ administrative data, individual LIAs’ administrative data, crowdsourcing (i.e., tool users input data themselves)
Information about community service providers to which clients were referred (name, address, reason for referral)	Model developers’ administrative data, individual LIAs’ administrative data, crowdsourcing (i.e., tool users input data themselves)
Results from client screeners	MIECHV state awardees (provide LIA-level data used to complete HRSA Form 2),* model developers’ administrative data, individual LIAs’ administrative data, crowdsourcing (i.e., tool users input data themselves)

To learn about the administrative data collected by LIAs, the team interviewed individuals from LIAs in Los Angeles County, the U.S. Commonwealth of the Northern Mariana Islands,<sup>4</sup> and Riverside-San Bernardino County Indian Health, Inc. The project team also sought to interview database management staff or analysts at three of the most widely used evidence-based home visiting models in the nation<sup>5</sup> (Healthy Families America, Parents as Teachers, and Nurse-Family Partnership). Although unable to secure an interview with Nurse-Family Partnership, the team received information about data that Nurse-Family Partnership requires sites to collect, which would thus presumably be available from the LIAs or the model developers.

The project team also reviewed three administrative forms that MIECHV state awardees regularly submit to HRSA (forms 1, 2, and 4). On these forms, state awardees report state-level information about their MIECHV-funded home visiting programs, such as the demographics of all families served across the state. As a first step to completing these forms, MIECHV state awardees must collect relevant information from every LIA (e.g., demographics of families served). Next, the MIECHV state awardees aggregate the LIA-level information to produce state-level statistics. Because the proposed tool requires LIA-level data, the project team proposes obtaining from state awardees the preliminary, LIA-level data that they must collect during the first step of preparing these three forms.

Table 2 indicates that crowdsourcing was explored as a potential data source during this process. Although crowdsourcing is technically not an administrative data source, it is mentioned here because the team began exploring its potential after learning about obstacles to obtaining administrative data for certain types of information. For example, information about the number of clients screened for depression can be obtained from the LIA-level data that state awardees use to complete HRSA Form 2; however, Form 2 does not collect information about the number of clients who had a positive screen for depression. Crowdsourcing would allow tool users to enter or edit information about results from any screeners administered in an LIA. However, due to concerns regarding the burden of vetting and managing crowdsourced data, the project team does not propose the use of crowdsourcing in the current tool.

#### *D. 4. c. Final recommendations*

Appendix D summarizes the project team's recommended data sources and describes the pros and cons of each recommendation.

The team selected the recommended data sources because they answer a user story, require minimal burden on LIAs or states, provide valid and reliable information, and are appropriately granular (i.e., to represent "neighborhood needs," data should be provided at the neighborhood level rather than the county level). The project team prioritized data sources that are updated regularly.

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<sup>4</sup> The U.S. Commonwealth of the Northern Mariana Islands is a HRSA awardee; their service area is similar to some of the LIAs the team interviewed.

<sup>5</sup> Usage was based on the number of children served in 2017 (National Home Visiting Resource Center, 2018).

Many of the recommended data sources are publicly available (e.g., data from 2-1-1, SAMHSA, the U.S. Census Bureau, and Google Maps). Selecting the data source for a list of all community service providers was perhaps the most challenging task. Ultimately, the project team chose 2-1-1 websites as the primary source for a list of community service providers because 2-1-1 websites include community service providers that have been reviewed by a person who understands the community service landscape, whereas Google Places listings go through a more generic review process. Another promising source for data on community service providers was San Francisco-based One Degree Inc., which includes a strict review process and allows providers to update information about their programs.<sup>6</sup> However, One Degree is currently limited to a few geographic regions, and only includes listings for nonprofit agencies providing free or low-cost services to low-income families. In contrast, 2-1-1 is available for every U.S. state and is not limited to nonprofit agencies. However, 2-1-1 also has limitations. For example, the information provided on 2-1-1 websites might be outdated. In addition, 2-1-1 is not available for U.S. territories (except for Puerto Rico); however, the lack of 2-1-1 in the territories may not be a limitation for LIAs in those locations, given that home visitors in the territories tend to know all providers due to their area's small size.<sup>7</sup> Also, addresses may not be shown for some providers, such as shelters. In addition, the providers' services may be offered at a location other than the address listed in 2-1-1 (e.g., if the provider offers services at individuals' homes). Another limitation is that 2-1-1 websites vary by locale, so there are inconsistencies across locales in terms of how providers are selected to appear on 2-1-1 websites and the types of provider information displayed on 2-1-1 websites.

For mapping functionality and transportation-related data, the project team recommends that the tool use Google Maps for several reasons. First, Google Maps relies on a data set powered by Google, at this time one of the world's largest generators and aggregators of location-based data. Google Maps is well understood by most professional application developers, and its data is constantly updated. Second, the cost to use Google Maps is lower than that of its closest competitors. With hundreds of thousands of daily users, Google supports its Maps product with best-in-class user-interface design, robust infrastructure, and excellent uptime. Finally, the Google Maps product can be integrated into an application in a manner that complies with Section 508 accessibility standards, and Google Maps is already in use on many U.S. government websites.

In addition to these public sources, other datasets will need to be drawn from home visiting administrative data (e.g., the names and locations of LIAs, zip codes of clients served in each LIA, client demographics, and data about client needs and referrals) to allow the tool to perform key functions and minimize burden on providers. The tool should capitalize on LIA-level data that states collect to complete HRSA's required MIECHV forms, including information about client demographics, results from three screeners (i.e., tobacco use, developmental delays, and intimate partner violence), and whether referrals were made in each of four categories (i.e., tobacco cessation, child development, intimate partner violence, and depression).

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<sup>6</sup> The One Degree website can be accessed at <https://www.1degree.org/>.

<sup>7</sup> This conclusion is based on discussions with a stakeholder from the Northern Mariana Islands.

Some user stories cannot be addressed with the proposed tool because the data needed to answer the question are not reasonably accessible; that is, these data could not be accessed without substantial investment of both time and money. For example, several user stories require data that LIAs do not systematically collect from clients, such as the reason(s) a client did not follow through with a referral. Other user stories require data that LIAs do not track in a uniform way, such as the name of a provider to which a client was referred. This makes data compilation and consistency difficult to achieve. (See Appendix B for the complete list of user stories with indications of which ones could not be addressed due to data limitations.)

Beyond the data sources recommended in Appendix D, the project team believes that there is potential for Google Places data (rather than, or in addition to, 2-1-1 data) to provide a reliable list of community service providers, even though the team found that searching Google Places returned a long list of extraneous providers. Future efforts could refine the search terms used to identify appropriate service providers in Google Places. Google Places is especially promising because (1) it provides a comprehensive set of business listings from multiple online and offline resources, (2) service providers continually update the data in Google Places (i.e., information about service providers), and (3) data in Google Places are easy to download and process. The tool developer should also investigate two promising efforts to compile community resources into a web-based tool—One Degree and Aunt Bertha.<sup>8</sup> Currently, One Degree is limited by geography, as previously mentioned, and Aunt Bertha is limited by cost and breadth of service providers included.

#### D. 5. Analysis plan development

Once the project team identified data sources to address user stories, the team developed a plan to visualize and present data for users, as well as anticipate challenges that might be encountered due to data limitations.

The analysis plan was organized to address four unique “use cases,” which refer to the end goals for interactions between users and the web-based tool. These use cases were developed based on the user stories, as described above. Each use case addressed a set of related user stories. The analysis plan described the data requirements, analytic steps, and visualization strategies that can be used to address each use case.

##### Use Cases

1. Identify Locations of Community Service Providers
2. Obtain Accurate Information About County Risk Indicators
3. Identify Gaps Between Community Service Providers and Community Need
4. Understand Accessibility of Community Service Providers

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<sup>8</sup> The Aunt Bertha website can be accessed at <https://about.auntbertha.com/>.

Appendix E provides a summary of the analyses and visualizations described in the analysis plan. Many of the analyses and visualizations described in the analysis plan were incorporated into the prototype for the proposed tool, described in the next section.

#### D. 6. Prototyping

The final stage of the work involved developing prototypes of the proposed tool. Prototypes are a typical feature of HCD projects; relative to building actual, working software or hardware, prototypes are an inexpensive, lightweight way to visualize and test concepts, approaches and interfaces. Prototypes allow the project team to efficiently explore solutions without much risk to the project budget or timeline.

In this project, prototyping allowed the team to consider how end users would logically want to interact with the tool to address their user stories. The prototypes the team developed illustrate one state (California) and one LIA within the state, reflecting the locations that were used during the data exploration task. Prototyping generally begins with very low-resolution sketches or flowcharts. From there, the project team began to map user flows through possible interfaces via flow charts and sketches. The user stories that were collected were translated into steps the user might take to conduct a search or develop a report in the system. Dozens of these very-low-fidelity sketches and flow charts were created (on paper, whiteboards, and via digital means) and discarded before the team arrived at the first low-fidelity prototype, developed in Adobe XD.

Adobe XD is software for designing and prototyping user experiences for websites and web applications. Its features allow a skilled designer to create wireframes, map out interaction design, overlay visual design, and output working prototypes—all in one tool. Adobe XD allows a user to leap from paper/whiteboard sketches to a realistic view of the final tool quite readily. While considered “low-fidelity” because there is no back-end code supporting their function, Adobe XD prototypes are visually similar to the final product. Therefore, the transition from low- to high-fidelity prototype in this project was really a matter of increased representational accuracy. These files provide a sturdy and well-planned foundation from which to begin a software build. Along with Adobe XD, the project team also used Photoshop to help build the prototypes.

After sharing the project’s first low-fidelity prototypes with stakeholders for feedback, the team incorporated their feedback and shared further iterations through feedback loops. The prototypes were very well received by stakeholders; they asked good questions about functionality and were enthusiastic about the tool.

One problem the project team encountered during the prototyping process was the lack of reasonably accessible data to populate needed features. As stated above and described more fully below, the team set aside some user stories for this reason. Therefore, the final prototype presented in this report is considered a Minimum Viable Product (MVP). An MVP is a product with enough features to satisfy early users—users who would be able to provide feedback for future product development. Gathering insights from an MVP is another way of mitigating software development (and product-failure) risk. In

this project, an MVP, even with limited data, would still provide significant utility—and significant improvement—over the status quo. Based on earlier work in the project, there is no one current resource that aggregates the data the proposed tool (even at MVP status) would be able to provide.

The next section describes the high-fidelity (highest-accuracy) rendition of the MVP prototype. The prototype is shared in this report as a series of screenshots. This is an imperfect way to view the system, as it is neither interactive nor presented at its best resolution. However, this is the most accessible way to share the prototype given the constraints of this report's format (PDF). The complete Photoshop and Adobe XD files are the best way to view and interact with the prototype, and the eventual software developer of this tool will find the Adobe XD files most useful.

## E. Proposed Tool

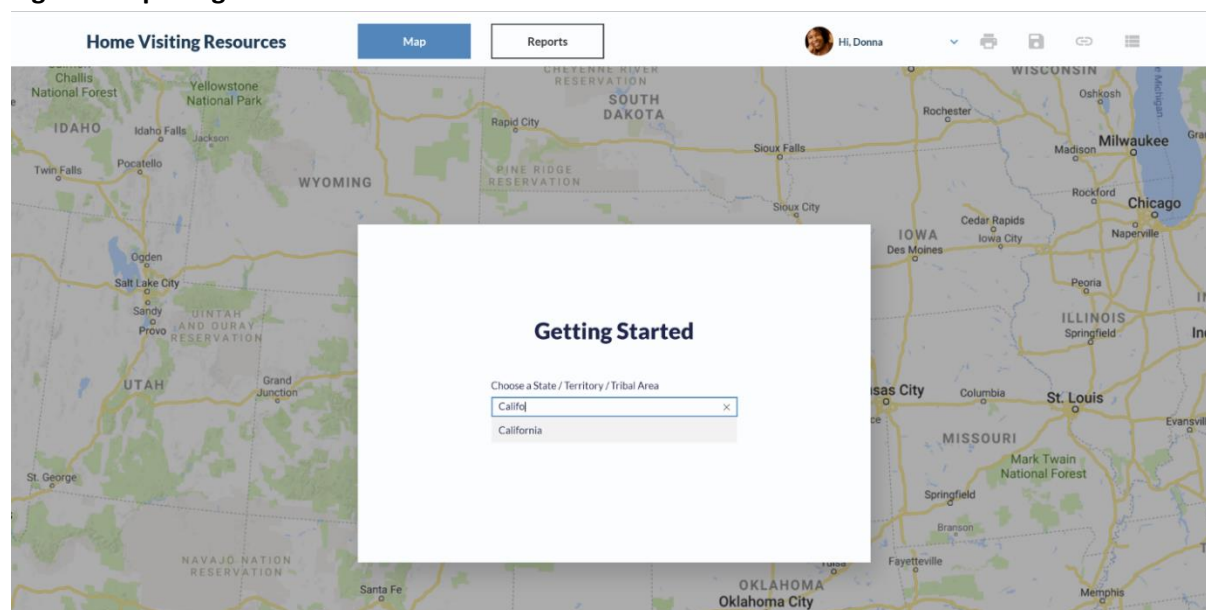
The work on this project, detailed above, culminated in the development of a high-fidelity prototype for a proposed tool aimed at improving the understanding of community connections in the home visiting context. In particular, the proposed tool would enable a stakeholder to better understand the availability and accessibility of service providers, and where there may be gaps between community needs and providers. This section walks through the screens that have been created for the final prototype. Appendix F describes the data sources and analytic methods needed to create each screen.

Before accessing the tool, users will need to be invited to the system via an email from HHS. Once at the login page included in the invitation email, users can establish an account, set their password (with two-factor verification, the current industry best practice to keep passwords secure and deter hackers), and complete a profile page with as much information as they choose. Figure 2 shows the opening screen where every user will arrive once they have created an account. At the top of the screen, there is a sample name of the tool (“Home Visiting Resources”). The system recognizes the user (“Donna,” the State Administrator user persona). In the upper-right corner, there are buttons to access tools that allow a user to print, save, generate a link to share a map or report with a colleague who has access to the system, and view a list of what a user has generated in the tool. There are also buttons at the top of the home page to access the map and reports functionality.

### E. 1. Map view

The map view allows users to see data (e.g., the geographic bounds of an LIA, provider locations) plotted on a map. When on the map view, the first task for a user of the system is to choose a geographic location. In Figure 2, the user chooses the state of California.

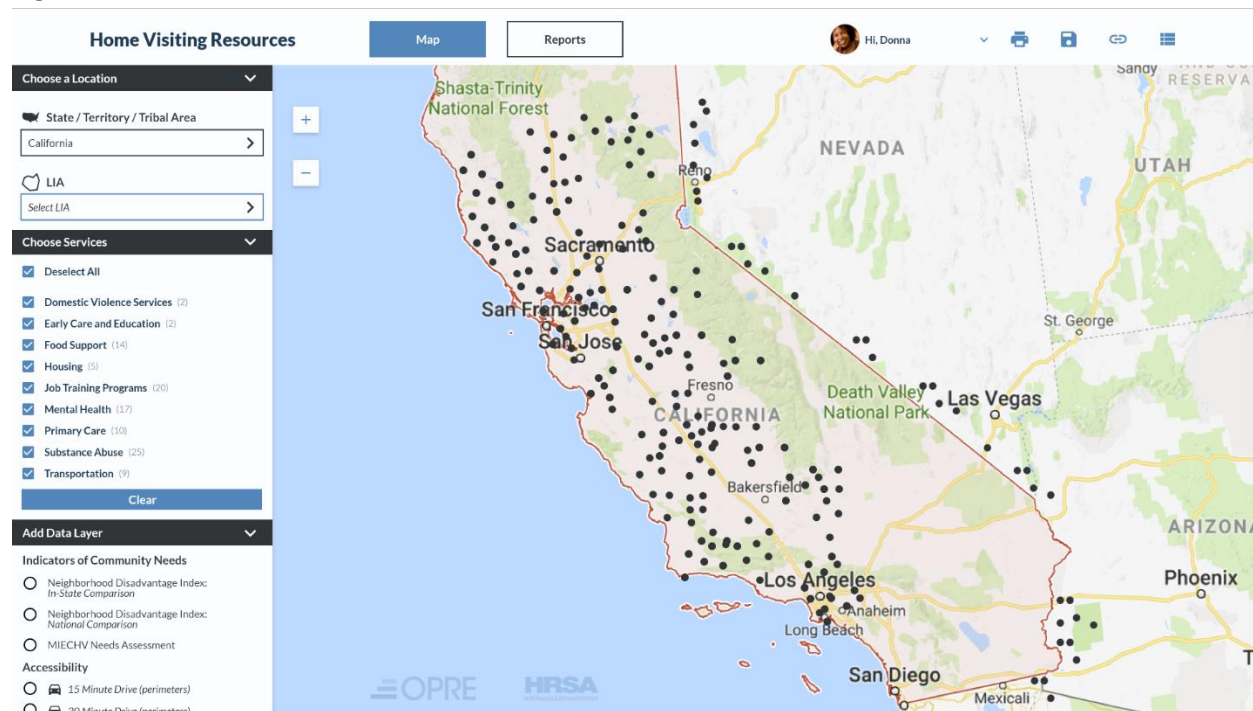
**Figure 2. Opening screen<sup>9</sup>**



<sup>9</sup> Figure 2 requires the following information: (1) *names and locations of all LIAs (source: HRSA).*

Once the map for California loads (see Figure 3), a user can explore the features of the map. Users can filter service providers by type of service and add data layers (e.g., layers showing community needs and accessibility metrics) using pull-down menus on the left. They can also narrow down the map to the LIA level before interacting with it.

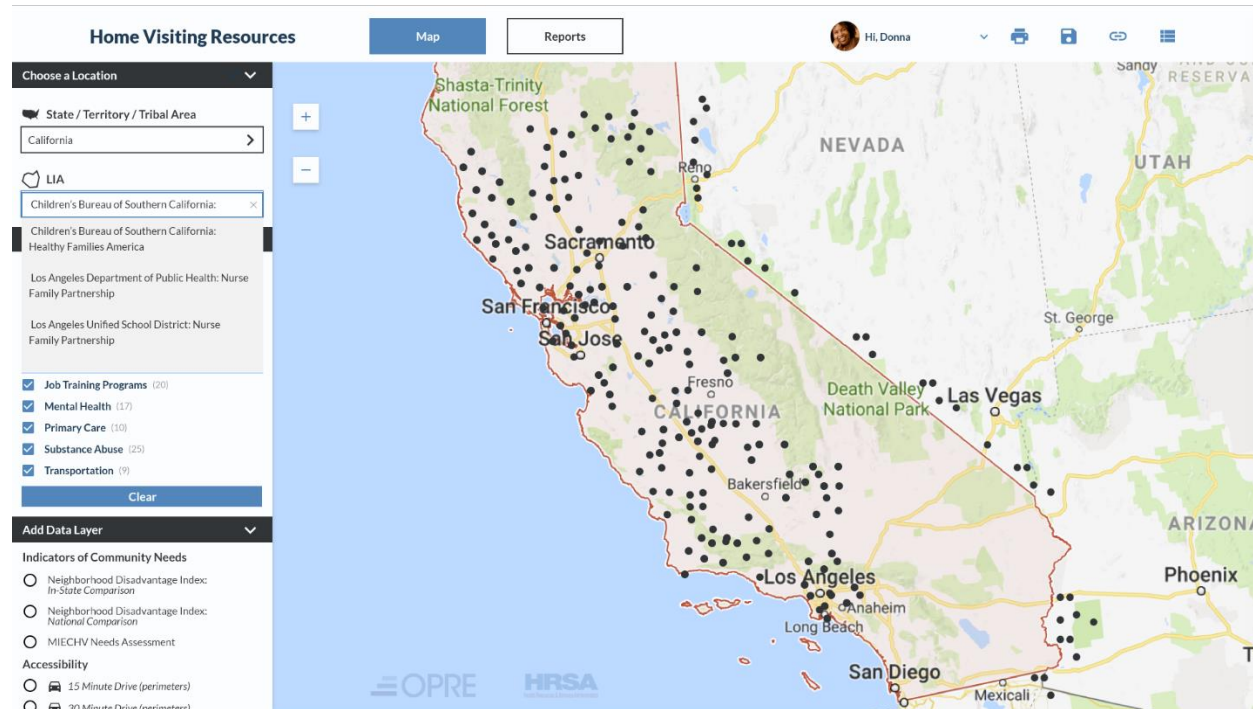
**Figure 3. State view<sup>10</sup>**



<sup>10</sup> Figure 3 requires the following information (1) names and locations of all LIAs (source: HRSA), (2) a list of all community service providers (source: 2-1-1), (3) latitude and longitude of community service providers (source: Google Maps), and (4) shapefiles with geographic boundaries (source: U.S. Census Bureau).

In the LIA menu in the "Location" panel on the left, a user can select an LIA (see Figure 4). A list of LIAs in California will appear in alphabetical order. As shown in Figure 4, a user selects the "Children's Bureau of Southern California."

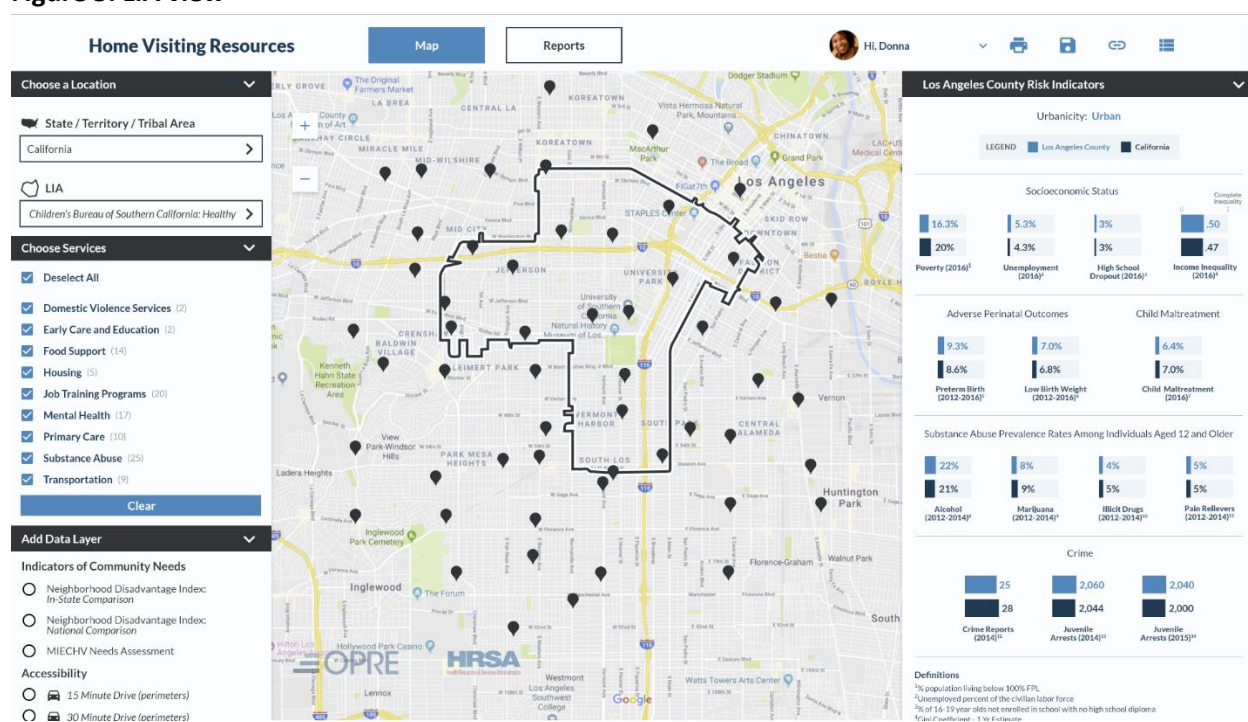
**Figure 4. LIA menu<sup>11</sup>**



<sup>11</sup> Figure 4 requires the following information: (1) names and locations of all LIAs (source: HRSA), (2) a list of all community service providers (source: 2-1-1), (3) latitude and longitude of community service providers (source: Google Maps), and (4) shapefiles with geographic boundaries (source: U.S. Census Bureau).

This action will focus the map on the individual LIA (see Figure 5). The map displays the LIA boundary and pins for service providers appear showing the location of each provider. In the right panel, risk indicators (e.g., socioeconomic status, child maltreatment rates) for the county containing the LIA are displayed for reference. Risk indicators are displayed at the county level (rather than the level of the LIA's service area) because states use county-level risk indicators to do their MIECHV needs assessments. As a result, users of the tool will be familiar with the county-level indicators and can use these indicators to compare counties within their state. Furthermore, risk indicators are not available at the level of the LIA's service area because most data used for the risk indicators are collected at the county level. On the left, a user can select a service type to narrow down the providers displayed on the map.

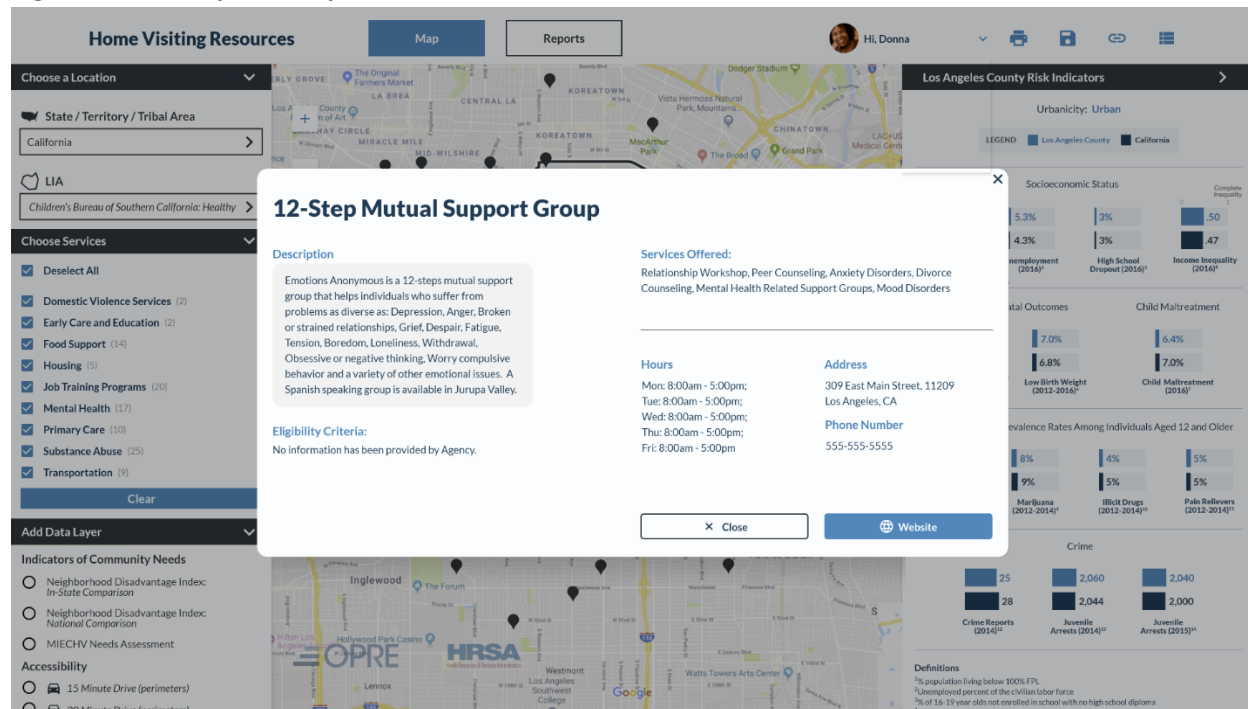
**Figure 5. LIA view<sup>12</sup>**



<sup>12</sup> Figure 5 requires the following information: (1) names and locations of all LIAs (source: HRSA), (2) a list of all community service providers (source: 2-1-1), (3) latitude and longitude of community service providers (source: Google Maps), (4) shapefiles with geographic boundaries (source: U.S. Census Bureau), (5) zip codes of clients served in the LIA (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 4), (6) county risk indicators (source: multiple data sources used to create HRSA's state needs assessment scores), and (7) county urbanicity (source: U.S. Census data with the principal city [or cities] of metropolitan statistical areas [MSAs], to use in combination with geographic boundaries of MSAs and counties).

By clicking a pin on the page, the user can see a full profile for that service provider (see Figure 6). The profile provides a description of the provider, eligibility criteria, services offered, hours of operation, contact information, and website.

**Figure 6. Service provider profile<sup>13</sup>**



<sup>13</sup> Figure 6 requires the following information: (1) a list of all community service providers (source: 2-1-1), and (2) latitude and longitude of community service providers (source: Google Maps).

After narrowing down the service providers by making selections in the "Services" panel on the left, a user can click the "list" icon in the top-right corner of the screen to receive a full list of providers and download that list as either a CSV or PDF file (see Figure 7). The user can select the information to appear in this list: provider description, services offered, eligibility criteria, hours of operation, contact information, and website.

**Figure 7. Provider list<sup>14</sup>**

Home Visiting Resources
Map
Reports
Hi, Donna

STATE: CALIFORNIA

LIA: Children's Bureau of Southern California: Healthy Families America

SERVICE CATEGORIES:

MENTAL HEALTH X

SUBSTANCE ABUSE X

+

COLUMN HEADINGS:

☒ DESCRIPTION

☐ SERVICES OFFERED

☐ ELIGIBILITY CRITERIA

☒ HOURS

☐ CONTACT INFO

☐ WEBSITE

Provider List

DOWNLOAD

CSV

PDF

PROVIDER

DESCRIPTION

HOURS

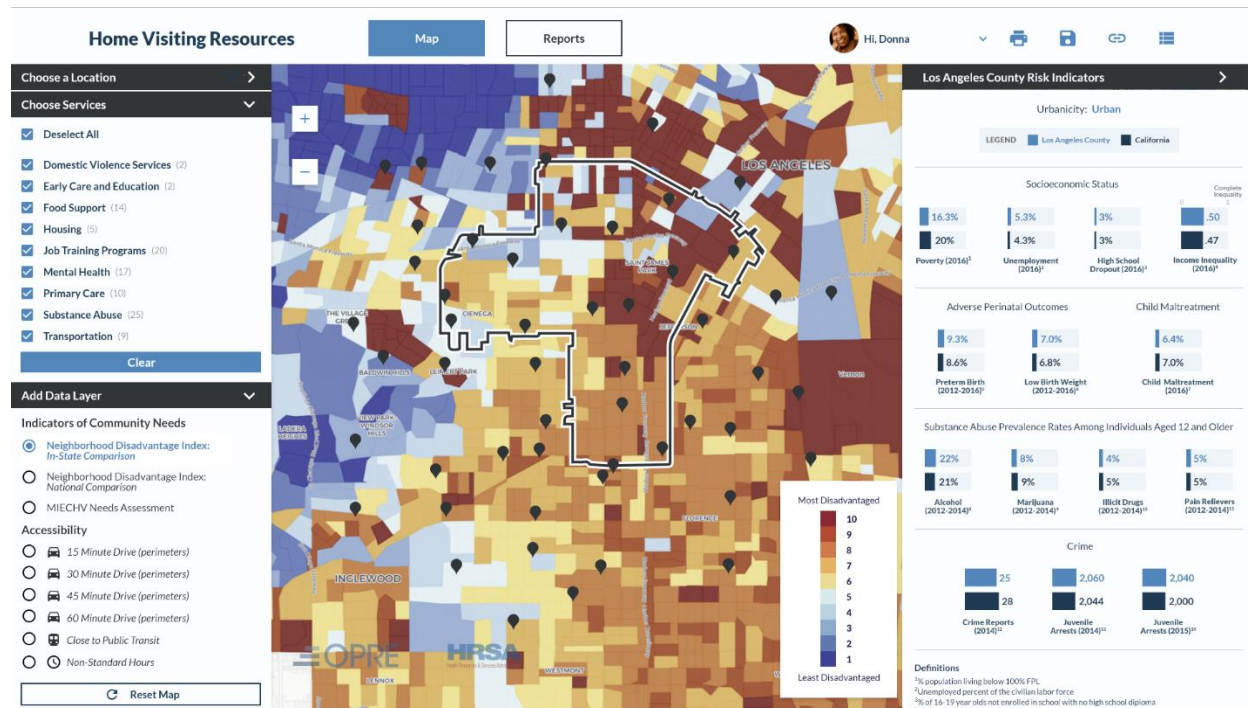
All Saints Home Care	The agency provides non-medical in-home support services for adults with disabilities, older adults, and new mothers who live in the cities of Agoura Hills, Burbank, Calabasas, Canoga Park, Chatsworth, Encino, Glendale, Granada Hills, Lancaster, Malibu, Monrovia, Mission Hills, Northridge, North Hills, Pacoima, Palmdale, Panorama City, Pasadena, Porter Ranch, Reseda, Santa Monica, Sherman Oaks, Studio City, Sylmar, Tarzana, Westlake Village, Woodland Hills, and West Los Angeles. There are geographic restrictions.	Mon - Fri, 9:00am - 5:00pm
Aviva Family And Children's Services - Outpatient Community Mental Health	The agency provides family life education for people of all ages in the San Fernando Valley. There are no geographic restrictions.	Mon - Fri, 8:30am - 6:00pm
Breakthrough Innovative Group	The agency provides counseling for people in Los Angeles County. There are no geographic restrictions.	Mon - Fri, 9:00am - 6:00pm; Sat, 8:00am - 12:00pm
Clutterers Anonymous	The agency provides health services to individuals living in Los Angeles County. There are no geographic restrictions.	Mon - Sun, 24 hours per day
Counseling4kids	The agency provides family life education for parents of children, ages 2 1/2 to 7, with behavioral problems, and mental health services for foster children, ages 3 through 18, who suffer from symptoms of Post Traumatic Stress Disorder and other forms of anxiety related to being abused or witnessing domestic violence in the home. Age restrictions may apply. There are no geographic restrictions.	Mon - Fri, 8:00am - 5:00pm
Counseling4kids - Torrance Office	The agency provides family life education for parents of children, ages 2 1/2 to 7, with behavioral problems and mental health services for foster children, ages 3 through 18, who suffer from symptoms of Post Traumatic Stress Disorder and other forms of anxiety related to being abused or witnessing domestic violence in the home. Age restrictions may apply. There are no geographic restrictions.	Mon - Fri, 8:00am - 5:00pm
Friendly House	The agency provides sober living and substance abuse services for women in Los Angeles County. There are no geographic restrictions.	Mon - Sun, 24 hours
Harbor Area High Gain Program Inc	The agency provides substance abuse services primarily for people in the Harbor area. There are no geographic restrictions.	Mon, Wed, 9:00am - 12:00pm; 1:30 - 7:30pm; Tue, Thu, Fri, 1:30pm - 7:30pm; Sat hours vary - call
Health First Medical - South	This is a program of the County of Orange Health Care Agency - Behavioral Health Services. Services are restricted to Orange County.	Mon - Fri, 7:00am - 7:00pm. Emergency hours: Mon - Sun, 24 hours
Life Counseling Center	The agency provides domestic violence services for adults in the San Fernando Valley. There are no geographic restrictions.	Mon - Fri, 9:00am - 10:00pm; Sat, 9:00am - 1:00pm; Sun, 8:00pm - 10:00pm
Motivational Systems	The agency provides counseling services, domestic violence services, and substance use disorder services for residents of Los Angeles County. There are no geographic restrictions.	Mon - Fri, 10:00am - 8:00pm; Sat, 8:00am - 1:00pm
Orange County Health Care Agency - Behavioral Health Services	211 LA County refers only to this private practice's court approved domestic violence services; it does not refer to private practices for general mental health services.	Mon - Sun, 24 hours
Pacific Psych Solutions	The program is a twelve-step self-help group for people who need help with clutter in their lives. There are no geographic restrictions.	Mon - Fri, 10:00am - 7:00pm; Sat, 9:00am - 2:00pm
Progress House - Soberville	The agency provides sober living services for men ages 18 and older in Los Angeles County. There are no geographic restrictions.	Mon - Sun, 8:00am - 5:00pm
Project Cuddle	The agency provides adoption and foster care services, outpatient mental health services for youth and families, and residential mental health services for adolescent girls, 12 to 18. Restrictions apply for some services; there are no geographic restrictions.	Mon - Fri, 9:00am - 5:00pm
Starting Over	The agency provides sober living services for substance abuse for men. There are no geographic restrictions.	Mon - Sun, 24 hours

<sup>14</sup> Figure 7 requires the following information: (1) a list of all community service providers (source: 2-1-1), and (2) latitude and longitude of community service providers (source: Google Maps).

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Figure 8 shows how, using the menu on the left, a user can add data layers to the map to provide important context on provider locations. For example, one option is to show MIECHV needs assessment information overlaid on the map. Another option is to show the Neighborhood Disadvantage Index (illustrated in Figure 8).<sup>15</sup> The Neighborhood Disadvantage Index shows areas of relative advantage and disadvantage (based on 17 poverty, education, housing, and employment indicators) at the census block group level. The areas shaded in red are most disadvantaged, and the areas shaded in blue are the least disadvantaged.

**Figure 8. Neighborhood Disadvantage Index<sup>16</sup>**

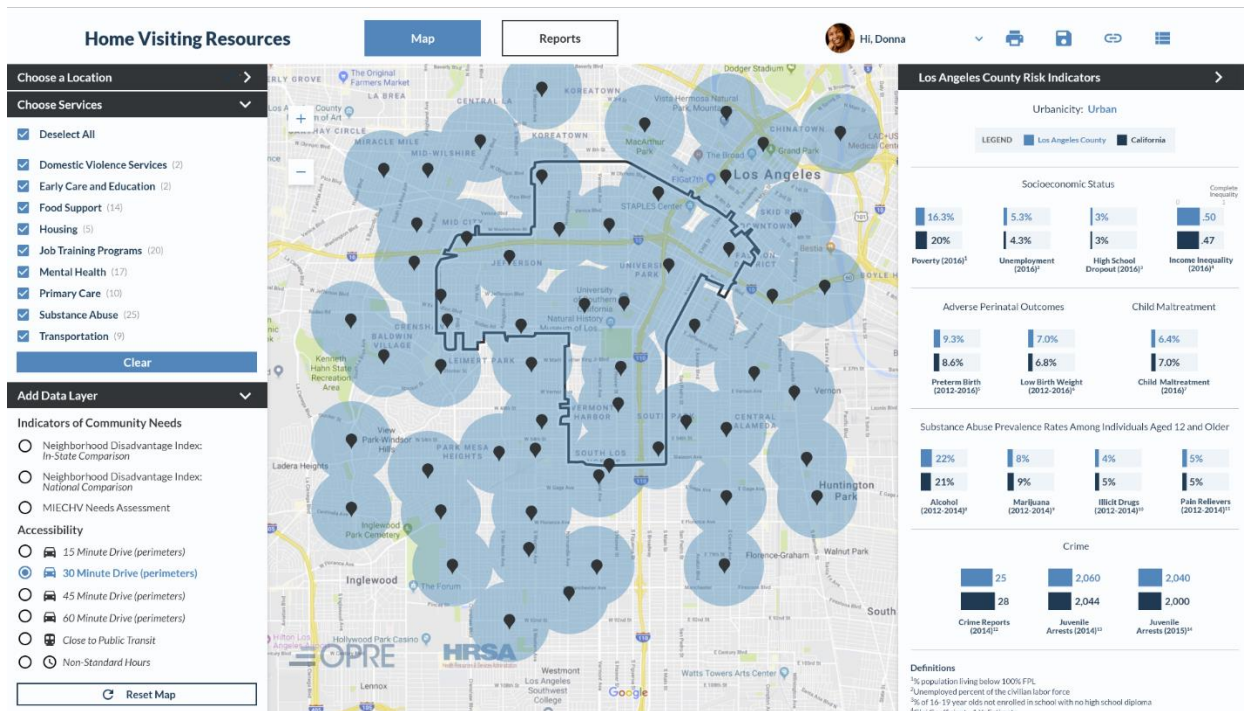


<sup>15</sup> The "Neighborhood Disadvantage Index" is the team's recommended label for data drawn from the Area Deprivation Index (University of Wisconsin School of Medicine and Public Health, 2018).

<sup>16</sup> Figure 8 requires the following information: (1) names and locations of all LIAs (source: HRSA), (2) a list of all community service providers (source: 2-1-1), (3) latitude and longitude of community service providers (source: Google Maps), (4) shapefiles with geographic boundaries (source: U.S. Census Bureau), (5) zip codes of clients served in the LIA (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 4), (6) county risk indicators (source: multiple data sources used to create HRSA's state needs assessment scores), (7) county urbanicity (source: U.S. Census data with the principal city [or cities] of metropolitan statistical areas [MSAs], to use in combination with geographic boundaries of MSAs and counties), and (8) an index of neighborhood disadvantage (source: Area Deprivation Index).

A user can also add a data layer to visualize the accessibility of providers. Users can choose to show information about driving distance (15, 30, 45, and 60-minute increments), proximity to public transit, and providers with non-standard business hours. Figure 9 shows shading around each service provider that represents areas within a 30-minute drive time. The unshaded areas depict where there are no providers within a 30-minute drive. This means that individuals living in the unshaded areas would have to drive for more than 30 minutes to reach a provider.

**Figure 9. Drive-time accessibility of providers<sup>17</sup>**



<sup>17</sup> Figure 9 requires the following information: (1) names and locations of all LIAs (source: HRSA), (2) a list of all community service providers (source: 2-1-1), (3) latitude and longitude of community service providers (source: Google Maps), (4) shapefiles with geographic boundaries (source: U.S. Census Bureau), (5) zip codes of clients served in the LIA (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 4), (6) county risk indicators (source: multiple data sources used to create HRSA's state needs assessment scores), and (7) county urbanicity (source: U.S. Census data with the principal city [or cities] of metropolitan statistical areas [MSAs], to use in combination with geographic boundaries of MSAs and counties).

## E. 2. Report view

In addition to the maps feature, users can generate reports by selecting "Reports" at the top of the page (see Figure 10). To create a report, the user selects an analysis type and a report format from the options below.

Analysis options:

- **Area Overview:** provides information about the number of service providers, the families served, and risk indicators for a given area (national, state/territory/tribal area, or LIA).
- **Supply and Demand:** compares statistics on providers and referrals to reveal gaps between available providers and the needs of the clients in the LIA and/or the needs of residents in the county.
- **Service Accessibility:** provides information about the accessibility of providers in a given area (national, state/territory/tribal area, or LIA), such as the percent of neighborhoods in an area that have a provider within a reasonable driving distance.

Format options:

- **Current Snapshot:** shows the latest data for a single location.
- **Geographic Comparison:** allows the user to compare two or more locations.
- **Longitudinal Comparison:** allows the user to compare data from two or more years for one location.

Figure 10. Reports landing page

The screenshot shows the 'Reports' landing page. At the top, there is a navigation bar with 'Home Visiting Resources', 'Map', and 'Reports' (which is highlighted). To the right of the navigation bar is a user profile for 'HI, Donna' and several utility icons (dropdown, print, save, link, and a menu icon). Below the navigation bar is a large light blue area with a 'Create a Report' button at the top. Underneath this button are two columns of options. The left column, titled 'CHOOSE ANALYSIS', contains three radio button options: 'Area Overview' (Data for providers, families served, and risk indicators by location), 'Supply and Demand' (Compares data on providers and referrals to reveal gaps), and 'Service Accessibility' (Provides accessibility data for locations). The right column, titled 'CHOOSE FORMAT', contains three radio button options: 'Current Snapshot' (Shows the latest data for a single location), 'Geographic Comparison' (Compares two or more locations), and 'Longitudinal Comparison' (Compares data from two or more years for single location). At the bottom center of these two columns is a 'SAVE AND CONTINUE' button.

As an example, in Figure 11, a user selects "Area Overview" and "Current Snapshot."

**Figure 11. Report selections, Area Overview and Current Snapshot**

The screenshot shows a web application interface for creating a report. At the top, there is a navigation bar with 'Home Visiting Resources', 'Map', and 'Reports' buttons. A user profile for 'Hi, Donna' is visible on the right. Below the navigation bar, a 'Create a Report' button is centered. The main content area is divided into two columns: 'CHOOSE ANALYSIS' and 'CHOOSE FORMAT'. Under 'CHOOSE ANALYSIS', there are three radio button options: 'Area Overview' (selected), 'Supply and Demand', and 'Service Accessibility'. Under 'CHOOSE FORMAT', there are three radio button options: 'Current Snapshot' (selected), 'Geographic Comparison', and 'Longitudinal Comparison'. A 'SAVE AND CONTINUE' button is located at the bottom center.

Next, the user must choose a location for the report (national, state/territory/tribal area, or LIA; see Figure 12).

**Figure 12. Report location menu<sup>18</sup>**

The screenshot shows the 'Create a Report' interface with the location selection menu. The 'ANALYSIS/FORMAT: Area Overview/Snapshot' is displayed at the top. Below this, the 'CHOOSE A LOCATION' section has three radio button options: 'National', 'State / Territory / Tribal Area' (selected), and 'LIA'. The 'State / Territory / Tribal Area' option has a dropdown menu labeled 'Select one ...'. The 'LIA' option has two dropdown menus labeled 'Select State' and 'Select LIA'. A 'GENERATE REPORT' button is located at the bottom center.

<sup>18</sup> Figure 12 requires the following information: (1) names and locations of all LIAs (source: HRSA).

As shown in Figure 13, a user chooses an LIA by first selecting California to narrow down the list of LIAs, and then selecting the LIA to examine. Then the user must click "Generate Report."

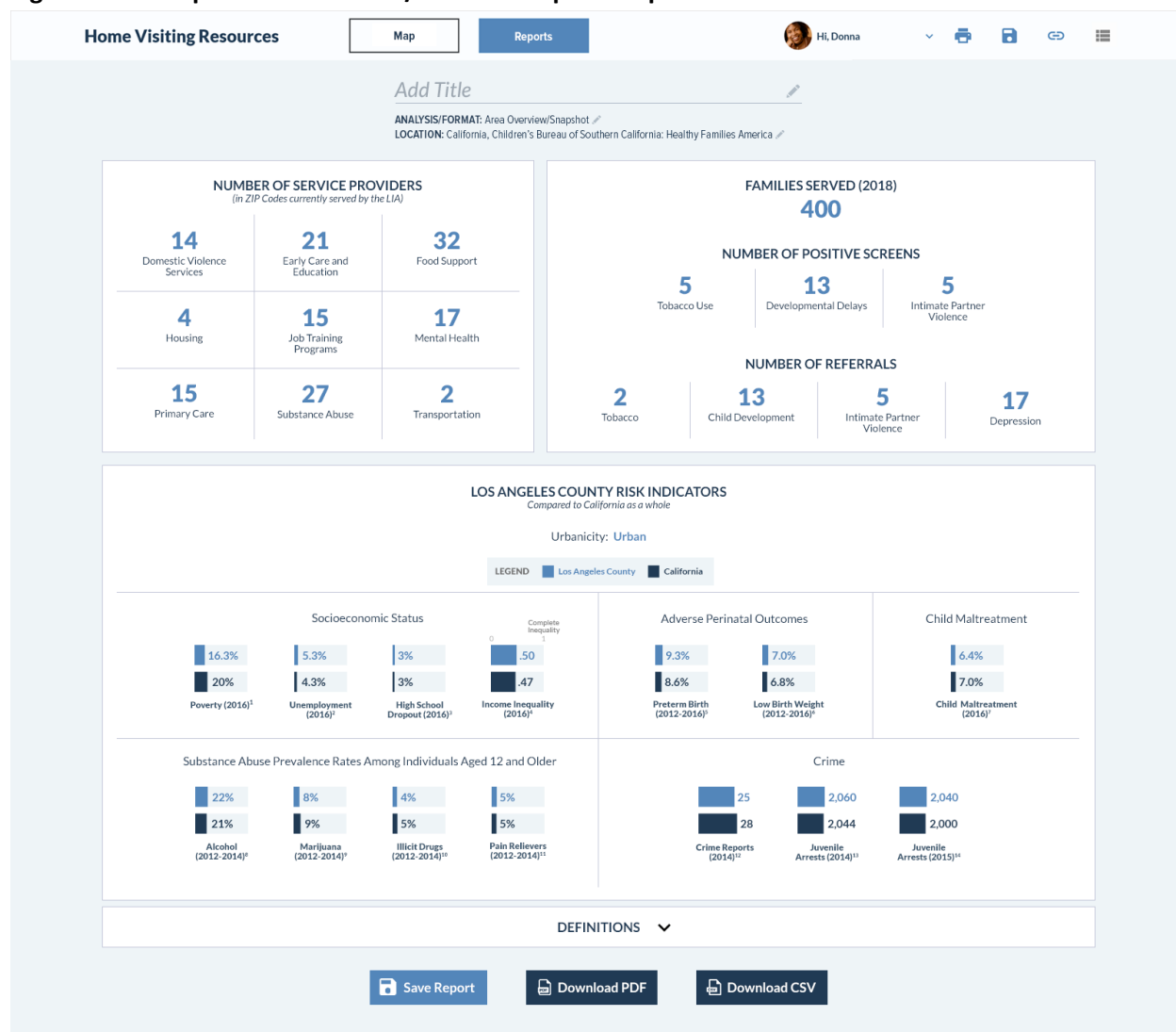
**Figure 13. Choose a location for a report, LIA<sup>19</sup>**

The screenshot displays a web application interface for creating a report. At the top, there is a navigation bar with 'Home Visiting Resources', 'Map', and 'Reports' buttons. A user profile for 'Hi, Donna' is visible on the right. The main content area features a 'Create a Report' section with a sub-header 'ANALYSIS/FORMAT: Area Overview/Snapshot'. Below this, a 'CHOOSE A LOCATION' form is presented. The form includes three radio button options: 'National', 'State / Territory / Tribal Area', and 'LIA'. The 'LIA' option is selected. Under 'LIA', there are two dropdown menus; the first is set to 'California' and the second to 'Children's Bureau of Southern Ca'. A 'GENERATE REPORT' button is located at the bottom of the form.

<sup>19</sup> Figure 13 requires the following information: (1) names and locations of all LIAs (source: HRSA).

Once the report is generated, a user can add a title and save the report to "My Maps/Reports." Additionally, a user can download a PDF of the report or a CSV of the data contained in the report. At the top of the report, each of the selections the user made to generate the report remains editable so that the user can continue to refine the report (see Figure 14).

**Figure 14. Example Area Overview/Current Snapshot report<sup>20</sup>**



<sup>20</sup> Figure 14 requires the following information: (1) a list of all community service providers (source: 2-1-1), (2) latitude and longitude of community service providers (source: Google Maps), (3) shapefiles with geographic boundaries (source: U.S. Census Bureau), (4) zip codes of clients served in the LIA (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 4), (5) county risk indicators (source: multiple data sources used to create HRSA's state needs assessment scores), (6) demographic data on home visiting clients (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 1), (7) number of client referrals in each category (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 2), and (8) results from client screeners (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 2).

As another example, a user can select a "Service Accessibility" report and a "Longitudinal Comparison" format (see Figure 15).

**Figure 15. Reports selections, Service Accessibility and Longitudinal Comparison**

The screenshot shows a web application interface with a top navigation bar containing 'Home Visiting Resources', 'Map', and 'Reports' buttons. A user profile 'Hi, Donna' is visible on the right. The main content area is titled 'Create a Report' and contains two columns of options. The 'CHOOSE ANALYSIS' column has three radio buttons: 'Area Overview' (Data for providers, families served, and risk indicators by location.), 'Supply and Demand' (Compares data on providers and referrals to reveal gaps.), and 'Service Accessibility' (Provides accessibility data for locations.), which is selected. The 'CHOOSE FORMAT' column has three radio buttons: 'Current Snapshot' (Shows the latest data for a single location.), 'Geographic Comparison' (Compares two or more locations.), and 'Longitudinal Comparison' (Compares data from two or more years for single location.), which is selected. A 'SAVE AND CONTINUE' button is at the bottom.

As with every report, the user first needs to choose a location (national, state/territory/tribal area, or LIA; see Figure 16).

**Figure 16. Choose a location for a report<sup>21</sup>**

The screenshot shows the 'Choose a Location' step of the report creation process. The top navigation bar is the same as in Figure 15. The main content area is titled 'Create a Report' and shows 'ANALYSIS/FORMAT: Service Accessibility/Longitudinal Comparison'. Below this is a 'CHOOSE A LOCATION' section with three radio buttons: 'National', 'State / Territory / Tribal Area', and 'LIA'. The 'LIA' option is selected, and it has two dropdown menus labeled 'Select State' and 'Select LIA'. A 'GENERATE REPORT' button is at the bottom.

<sup>21</sup> Figure 16 requires the following information: (1) names and locations of all LIAs (source: HRSA).

Next, the user needs to choose years to compare since the longitudinal comparison format was selected (see Figure 17).

**Figure 17. Choose years to compare**

The screenshot shows a web application interface. At the top, there is a navigation bar with 'Home Visiting Resources' on the left, 'Map' and 'Reports' buttons in the center, and a user profile 'Hi, Donna' with a dropdown arrow and icons for print, save, share, and menu on the right. The main content area has a light blue background. In the center, there is a white box titled 'Create a Report' with a clipboard icon. Below the title, it shows 'ANALYSIS/FORMAT: Service Accessibility/Longitudinal Comparison' and 'LOCATION: California'. Below this is a white box titled 'CHOOSE YEARS TO COMPARE' containing a list of years from 2012 to 2018, each with an unchecked checkbox. At the bottom of this box is a grey button labeled 'SAVE AND CONTINUE'.

As shown in Figure 18, the user chooses 2017 and 2018 for this example.

**Figure 18. Choose years to compare, 2017 and 2018**

This screenshot is identical to Figure 17, but with the checkboxes for the years 2017 and 2018 selected. The 'SAVE AND CONTINUE' button at the bottom of the 'CHOOSE YEARS TO COMPARE' box is now blue.

Next, the user needs to choose one or more service types (e.g., domestic violence services, early care and education, food support) since the service accessibility report was selected (see Figure 19).

**Figure 19. Choose services**

Home Visiting Resources

Map Reports

Hi, Donna

Create a Report

ANALYSIS/FORMAT: Service Accessibility/Longitudinal Comparison ✓  
LOCATION: California ✓  
YEARS: 2017, 2018 ✓

CHOOSE SERVICES

- ☐ Select All
- ☐ Domestic Violence Services
- ☐ Early Care and Education
- ☐ Food Support
- ☐ Housing
- ☐ Job Training Programs
- ☐ Mental Health
- ☐ Primary Care
- ☒ Substance Abuse
- ☐ Transportation

GENERATE REPORT

For this example, the user chooses "Substance Abuse" and then clicks "Generate Report" (see Figure 20).

**Figure 20. Choose services, substance abuse**

Home Visiting Resources

Map Reports

Hi, Donna

Create a Report

ANALYSIS/FORMAT: Service Accessibility/Longitudinal Comparison ✓  
LOCATION: California ✓  
YEARS: 2017, 2018 ✓

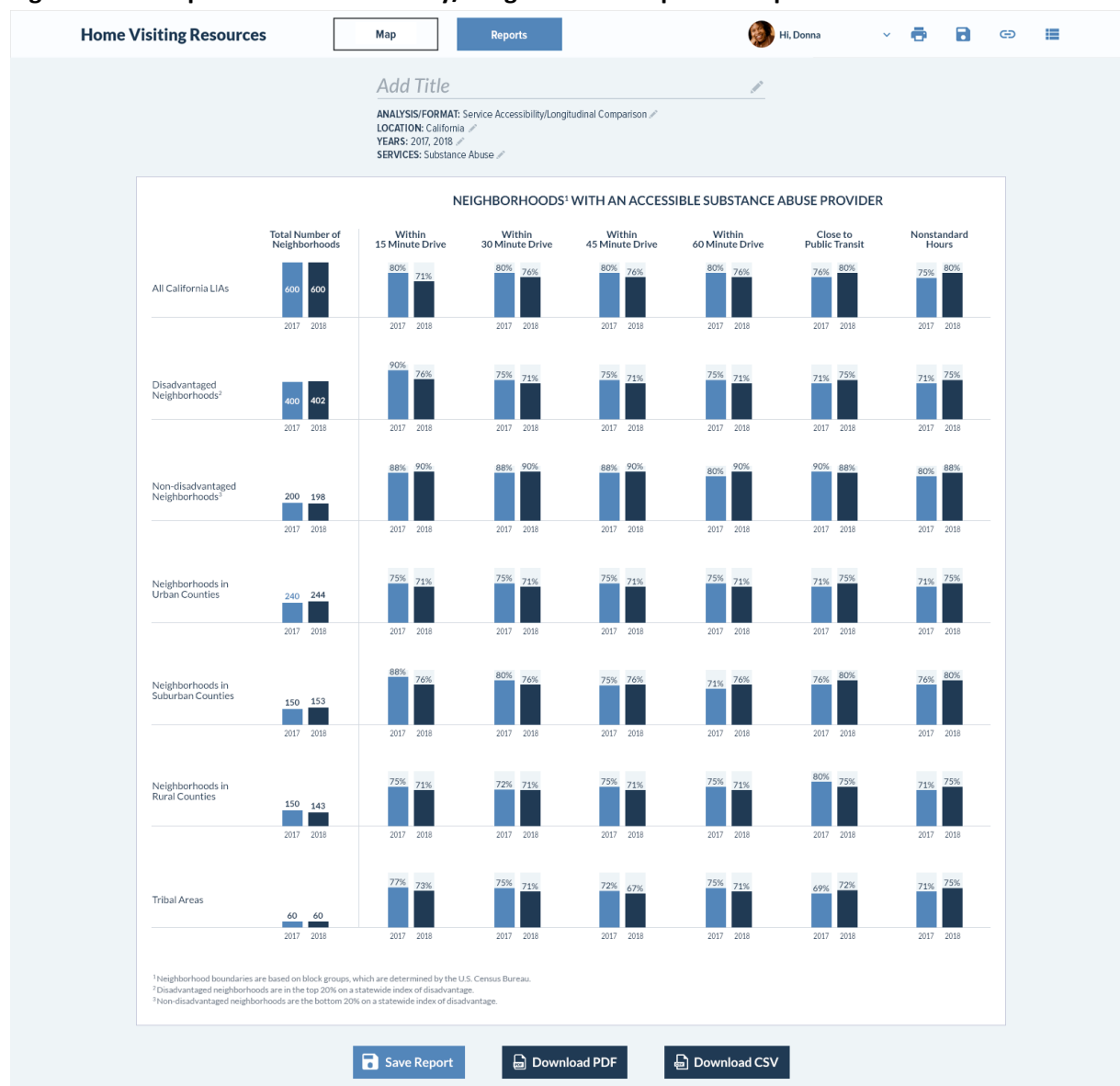
CHOOSE SERVICES

- ☐ Select All
- ☐ Domestic Violence Services
- ☐ Early Care and Education
- ☐ Food Support
- ☐ Housing
- ☐ Job Training Programs
- ☐ Mental Health
- ☐ Primary Care
- ☒ Substance Abuse
- ☐ Transportation

GENERATE REPORT

Again, once the report is generated, the user can add a title and save the report to "My Maps/Reports." Additionally, a user can download a PDF of the report or a CSV file of the data contained in the report. At the top of the report, each of the selections the user made to generate the report remains editable so that the user can continue to refine the report (see Figure 21).

**Figure 21. Example Service Accessibility/Longitudinal Comparison report<sup>22</sup>**

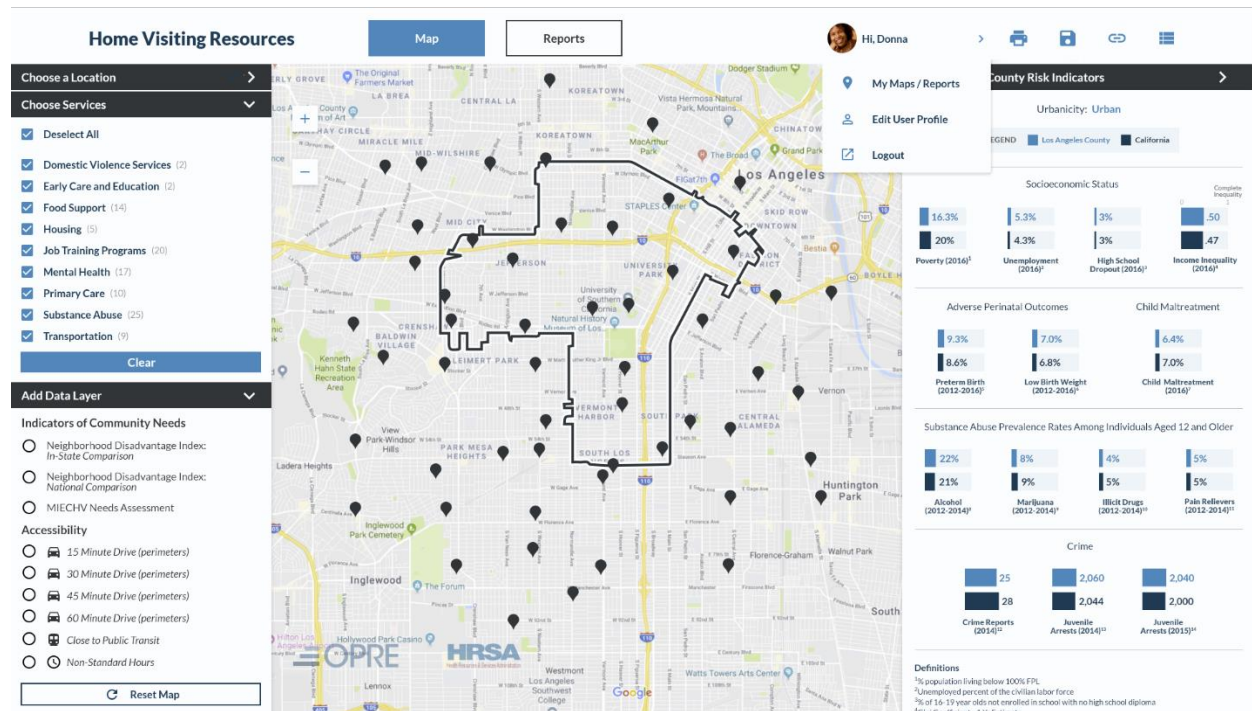


<sup>22</sup> Figure 21 requires the following information: (1) a list of all community service providers (source: 2-1-1), (2) latitude and longitude of community service providers and public transit stops (source: Google Maps), (3) shapefiles with geographic boundaries (source: U.S. Census Bureau), (4) zip codes of clients served in the LIA (source: state MIECHV awardees to provide LIA-level data used to complete HRSA Form 4), (5) an index of neighborhood disadvantage (source: Area Deprivation Index), (6) county urbanicity (source: U.S. Census data with the principal city [or cities] of metropolitan statistical areas [MSAs], to use in combination with geographic boundaries of MSAs and counties).

### E. 3. User profile

Users can personalize the tool to improve their experience and save time. There are two options in the account menu in the header: "My Maps/Reports" and "Edit User Profile" (see Figure 22).

Figure 22. Account menu




"My Maps/Reports" is where users can save any map or report they have created for reference (see Figure 23). From here, a map/report can be reopened, copied, or edited and resaved.

Figure 23. Saved Maps/Reports

Home Visiting Resources

Map

Reports

Hi, Donna

Saved Maps/Reports

TITLE	TYPE	LOCATION		
<a href="#">California Mental Health Providers Report</a>	Report	State: California	<a href="#">EDIT</a>	<a href="#">COPY</a>
<a href="#">California Substance Abuse Providers Report</a>	Report	State: California	<a href="#">EDIT</a>	<a href="#">COPY</a>
<a href="#">Mental Health Providers &amp; Drive Time Map</a>	Map	LIA: Children's Bureau of Southern California: Healthy Families America	<a href="#">EDIT</a>	<a href="#">COPY</a>
<a href="#">Substance Abuse Providers &amp; Drive Time Map</a>	Map	LIA: Los Angeles Department of Public Health: Nurse Family Partnership	<a href="#">EDIT</a>	<a href="#">COPY</a>

Registered users can also edit their profiles (see Figure 24). This gives users a way to change their passwords and update contact information. Additionally, users can edit their start page to immediately load a preferred location after login.

**Figure 24. User profile**

The screenshot shows the 'Edit Your Profile' form within the 'Home Visiting Resources' application. The form is titled 'Edit Your Profile' and includes a close button (X) in the top right corner. The form is divided into several sections:

- Personal Information:** Fields for First Name (Donna), Last Name, Email Address (donna@stateadmin.gov), Job Title, Role (State Administrator), and Organization.
- Profile Photo:** A photo of a woman with curly hair, labeled 'Profile Photo' with an 'EDIT' button.
- START PAGE PREFERENCE:** Radio buttons for 'Default', 'State / Territory / Tribal Area' (selected), and 'LIA Map'. The 'State / Territory / Tribal Area' option has a dropdown menu showing 'California'. The 'LIA Map' option has two dropdown menus for 'Select State' and 'Select LIA'.
- CHANGE PASSWORD:** Fields for 'Current Password' and 'New Password', with a 'SAVE PASSWORD' button.
- Can't remember your password?:** A button labeled 'SEND PASSWORD RESET TO YOUR EMAIL'.
- Footer:** A link to 'How will my data be used? Read our [privacy policy](#)'.

These prototype screenshots provide an overview of the functionality proposed for the tool. The project team did not include system administrator views in the prototyping process since these administrative views would not be seen by users of the tool. However, system administrators play a critical role in any application development, so Trilogy provided system administrator user stories (see Appendix B) and specified development processes (Appendix F) related to the proper framework, tools, and interfaces for the proposed tool.

#### E. 4. Additional features for the MVP

While many features of the proposed tool are illustrated in the above prototype, additional functionality was discussed over the course of the project. These ideas include:

- A national-level report that provides:

- A view that shows what percentage of LIAs in the nation have a provider in any specified service type
- A view that shows what percentage of LIAs in the nation do not have ANY providers in a service type
- A view that shows how many LIAs in the nation have at least one provider in a service type
- A map view that shades counties depending on how many of the county's HRSA risk indicators are worse than the state's average (and a report with the same data)
- A map view that shows providers with non-standard hours via color-coded pins
- A map view that shows only those providers that are close to public transit

The project team suggests that the tool developer include the above features in the MVP, a minimum viable product.

## F. Limitations and Possible Future Directions

From the inception of the AMC-HV project, the web-based tool was intended to capitalize on existing data as much as possible. The project team was able to identify many existing data sources to populate the proposed tool and address many user stories; however, the section below explores the various reasons the project team was not able to identify data to address every user story.

### F. 1. LIAs may not be able to aggregate and share the data that they collect

Many of the user stories reflected stakeholders' desires to see home visiting administrative data that exist but are not readily accessible to most stakeholders. To understand the limitations of aggregating and sharing administrative home visiting data with stakeholders, the team interviewed several representatives of LIAs and home visiting models. The team learned that compiling the data for use outside the LIA would be an enormous challenge due to variation in how LIAs manage data. The types of information that are especially limited due to challenges of aggregating data include:

- **The number of referrals to each community service provider.** Home visitors often track referrals to providers on paper rather than with a computerized tracking system; therefore, compiling a list of providers (and the frequency with which clients are referred to them) would place an administrative burden on LIAs. Even when LIAs use digital systems to track referrals, the name of the provider to which a client was referred is typically entered in a text box—a format that limits easy, comprehensive collection of provider data because the text box allows users to enter the referral information any way they like. It would be resource intensive to compile data on referrals made to each community service provider given that providers' names may be written several different ways (e.g., abbreviated, misspelled, or with a colloquial name instead of a provider's official name).
- **Results from client screeners and number of clients referred for services, by each service type (e.g., mental health).** LIAs and home visiting models vary in the way home visitors record the results from screeners and the type of service to which a client was referred. Many LIAs would not be able to prepare a dataset with this information—even aggregated across clients—without a substantial investment of time. Currently, LIAs collect results of three screening categories (tobacco use, developmental delays, and intimate partner violence) and four referral categories (tobacco cessation, child development, intimate partner violence, and depression); the state MIECHV awardee then gathers that information to report at an aggregate level to HRSA. The project team learned, however, that stakeholders want to know about clients' needs in several additional categories (e.g., clients' needs for housing and child care). Many LIAs administer additional screeners that address these stakeholder interests, such as the Life Skills Progression (assessing families' education, employment, housing, food, and child care access) and a general anxiety assessment. In addition, LIAs make referrals to other types of community service providers, such as housing assistance. Because there are no HRSA measurement or reporting requirements for these additional screeners and referrals, many LIAs may measure screening/referral categories differently and/or do not have systems in place to aggregate these data across clients. Therefore, while the information LIAs currently collect to fulfill HRSA

reporting requirements could be used, it does not address all the stakeholder interests. Compiling data from these additional screener and referral categories would place a significant burden on LIAs given the need for consistency in measurement and the need to aggregate data across clients.

- **Clients' follow-through on referrals.** Stakeholders were very interested in knowing which community service providers were most successful at engaging clients in services. During conversations with representatives from two home visiting models, however, the project team learned that obtaining data on clients' follow-through on referrals would be a burden on some LIAs and impossible for others. This challenge is related to the fact that LIAs often do not track the name of the provider clients were referred to in a systematic way (see above); however, the varying requirements for tracking the completion of referrals add to this challenge. For example, the Healthy Families America home visiting model *does* require LIAs to record when clients complete a referral; however, Healthy Families America *does not* require LIAs to record this information in any particular format. As a result, many home visitors simply make notes about their clients' completion of referrals in the narratives they write after home visits. In other words, while some LIAs implementing Healthy Families America may have designed their own systems to track clients' completion of referrals and may be able to aggregate the data for use in the tool, others would need to review every narrative written by a home visitor to aggregate their data. In addition, Parents as Teachers offers LIAs the free use of its Penelope data management software. Penelope includes a function that allows home visitors to check boxes when each stage of a referral has been completed: "contact attempted," "contact made," "services initiated," "on wait list," and "not eligible/unable to attend." However, since checking these boxes is optional, it is unclear how many LIAs would complete the information.
- **Disaggregated data by client race, ethnicity, gender, and language spoken.** The variation in data collection and management systems means that it would be a burden to provide any of the above data disaggregated by demographic group (e.g., number of positive depression screens for clients who are Hispanic and non-Hispanic). For some LIAs, this task would involve going through client records by hand to break out data points by demographic group.
- **Activities to develop partnerships between LIAs and community service providers.** None of the LIAs the project team interviewed knew of an official, up-to-date record of their partnership-building activities, such as MOUs or in-person meetings with community service providers. Information about each partnership-building activity likely exists (e.g., in LIA administrators' emails), but it would be a burden for an LIA to regularly compile this information.

## F. 2. Some data do not exist

Other user stories reflected stakeholders' desire for information that does not currently exist, including:

- **Capacity of community service providers.** A common frustration among home visitors is that community service providers exist, but they are not accepting new clients. The project team was unable to find a source that would provide data on the number of new clients that providers can serve. The team explored the potential of using publicly available IRS 990 filings to determine

the number of employees at each service provider, which would be a proxy for the capacity of that provider. However, it would require considerable effort to connect programs from 2-1-1 to their IRS 990 data due to differences in the way provider names are recorded. Furthermore, at the end of that process, most programs (including nonprofit, public, and for-profit) still would not have a determinable size because of limitations with the IRS 990 data (nonprofit providers) or a lack of IRS data (public and for-profit providers).

- **Quality of community service providers.** Many stakeholders wanted the tool to describe the quality of community service providers; however, quality is a broad concept, and it can be subjective without carefully designed measures. The project team considered using data from platforms that have rating systems, such as Yelp and Facebook, but learned that these ratings often come from volunteers or others in the community rather than clients. These ratings also lack a clear definition of “quality” and can be unrepresentative of the average client experience.
- **Client reasons for not following through with referrals.** Stakeholders wanted to understand why clients do not use the services to which they are referred. For example, were clients disinclined to visit service providers who did not speak their language? This type of information, typically gathered anecdotally during meetings with the client, is generally not recorded anywhere.
- **An accurate list of community service providers, along with accurate information on hours of operation, eligibility criteria, insurances accepted, services offered, and languages spoken.** The project team decided to use 2-1-1 as the source for information about community service providers because it offered the best balance of (1) the comprehensiveness of the listed providers, (2) the relevance of providers to the needs of home visiting clients, and (3) the accuracy of information provided. However, there are several limitations of 2-1-1 data (i.e., lack of timely updates, incomplete information, inconsistencies by locale), as described above and in Appendix D. The team recommends combining 2-1-1 data with SAMHSA’s list of substance abuse service providers. This approach is still limited by the fact that 2-1-1 and SAMHSA have different data systems, and work is required to combine the resulting providers from each site.

### F. 3. Addressing user stories in the absence of “ideal” data

As described above, the project team was able to address many user stories with the proposed tool despite the limitations of the data. Whenever possible, when specific data sources were not available, the team developed alternative or broader ways to address some user stories. For example, in the absence of data from LIAs on the number of clients having positive screens for alcohol and illicit drug use, the team recommends displaying county-level risk indicators for the county in which the LIA is located. This approach allows the tool user to recognize the potential need for substance abuse providers in the LIA in the absence of LIA-specific screener data.

### F. 4. Possible future directions

Despite these limitations, stakeholders indicated that the proposed tool would be a considerable improvement over what is currently available at the national level (i.e., standalone websites such as 2-1-1 that do not integrate all the features the proposed tool would offer). While these pre-existing

resources and data sources answer some user stories already, there is currently no tool that combines the various functions and features this proposed tool offers. While individuals can search for providers on existing 2-1-1 websites, they are unable to see those providers listed on a map alongside various community contextual factors and identify the accessibility of those providers as this tool would allow. In addition, there is no existing tool that allows individuals to generate reports to compare the availability of providers to key data about the needs of families served by home visiting programs and in the larger community. Moreover, the tool allows users to compare the availability of providers in specific LIAs or other geographic regions with the click of a button. Stakeholders noted that the tool allows them to better understand the availability of types of community providers in specific geographic areas. They noted this specific information helps them to begin to understand *why* there are insufficient providers in some places and why some referrals do not result in clients obtaining needed services. While these features do not address all the user stories that were shared with the team, the tool clearly addresses many stakeholder needs.

That said, the project team envisions the MVP as the first stage in a course of continuous improvement for the tool. Therefore, this section offers the following ideas for moving beyond an MVP in the future:

- **Enhance the data about available community service providers.** Specifically, conduct meetings with 2-1-1 website staff and users from various locations to better understand how comprehensive 2-1-1 provider listings are and what information gaps may exist. Also explore Google Places data more fully to provide more robust information about providers, and compare the data obtained from various sources to ensure the validity and completeness of the data obtained. Data from Google Places could be used, in addition to 2-1-1 and SAMHSA data. Aunt Bertha (a website that compiles information about community resources) could be explored as a potential current source of national data, if the high cost is not a barrier, and if the breadth of listed service provider categories is expanded. (Currently, it appears to focus on services related to the health sector, especially for older adults). One Degree (a website that provides information about nonprofits providing free or low-costs services to low-income families) and other similar services operating in California also could be data sources, if expanded nationally.
- **Crowdsourcing.** The web-based tool could “crowdsource” information by letting users add or edit data. Stakeholders told the project team that they were very interested in being able to add data to the system themselves, thus ensuring that more up-to-date or locally known information would be included in the tool. Due to concerns regarding the burden of vetting and managing crowdsourced data, the current tool does not leverage this data source. Future development of this web-based tool should consider crowdsourcing to collect data, especially pertaining to:
  - providers with which the LIA has an MOU
  - the frequency of referrals made to specific community service providers (and including the provider’s name, address, and the reason for the referral)
  - the number of client referrals in each service type, beyond those collected to meet HRSA reporting requirements

In addition, the tool developer could add an interface for other stakeholder groups, such as community service providers, that would allow them to indicate their capacity or express their interest in developing a partnership with home visiting programs. The tool could also allow home visitors and clients to provide feedback on community service providers. While crowdsourcing is a powerful way to compile data not currently available, it would require extensive resources to implement and maintain.

- **Supporting systematic data collection strategies across LIAs.** Stakeholders could work together to develop common methods for tracking certain data. Of note, data tracking could be improved via adoption of data interoperability standards for screening and referral data to facilitate data sharing and aggregation. That is, every LIA could use their own data system to manage their caseloads and enter client data. With an interoperable data system, client-level data could be integrated and shared across systems using common data definitions and formats. A benefit of this data interoperability is that more information would be available at the client level across programs, satisfying one of the stakeholder interests to present results separately for different subgroups of interest. Analyses could also examine predictors of client outcomes since longitudinal data would be available for clients.

In the absence of interoperable data used by all LIAs, LIAs can nevertheless improve the data available by expanding or altering the types of data they systematically collect on all referral needs and sources. Specifically, data collection on clients' needs, as well as referrals to relevant agencies, in the following categories (which are included in the project's Statement of Objectives and/or identified by the stakeholders engaged in the project) would be very useful:

- Early care and education
- Housing assistance
- Food assistance
- Career assistance
- Mental health other than depression (e.g., anxiety)
- Binge drinking, painkiller abuse, and illicit drug use

Stakeholders communicated a strong desire to find answers to important questions about referrals and coordination. Increasing the amount and consistency of data on these topics will help address these questions. While these suggestions would provide more robust data needed for home visiting stakeholders, it would place a higher burden on LIAs, which would become responsible for collecting these additional data and adjusting their data systems.

- **Consider additional target user groups.** The current proposed tool considers federal staff, state administrators, and LIAs as the target end users. However, the project team also heard that families and home visitors themselves may benefit from the tool. For instance, these two groups could access the tool to provide reviews of providers. Home visitors could access the tool to aid in the referral process if there were features that allowed tracking referrals throughout the

process.<sup>23</sup> Researchers are another potential future user of the tool who could help HHS better understand relationships between the availability and accessibility of service providers and MIECHV awardee performance on various aspects of referral-making.

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<sup>23</sup> One example of a tool that allows for tracking referrals is the Integrated Referral and Intake System (IRIS) used in Kansas. This tool allows someone making a referral to enter into the system basic information about a family, including the family's needs. Once this user has identified a service to meet that family's needs, the user can electronically send a referral to that service. One major difference between IRIS and the proposed tool is that the IRIS tool is a case management system that, in addition to describing available resources, also captures referral uptake. This means that the system tracks whether a family actually uses a service after they have received a referral. This feature is outside of the capacity of the proposed tool as it would require providers to routinely update the tool.

## G. Reflections

As described above, home visiting stakeholders were central to the team's ability to execute this project and develop a proposed tool. Their engagement and enthusiasm underscore their deep interest in better understanding connections to community services and enabled the team to develop a prototype for a proposed tool that would help address many of their needs. During this work, the team also learned a great deal about the complexity of referrals in the home-visiting context, what stakeholders need to know related to community connections, and what analyses are needed to address stakeholder needs. This section summarizes the team's reflections on these topics.

### G. 1. Making referrals in home visiting is a complex process

This project allowed the team to better understand the process for making referrals in the home visiting context. In particular, the work showed that the process by which home visitors make referrals to community resources is complex. For example, home visitors may consider the availability and accessibility of a provider, and whether they have an existing relationship with a provider, before referring a family for services. Furthermore, home visitors may struggle with identifying appropriate community services to refer families to for a specific need (e.g., substance abuse). In some cases, these services simply do not exist in the community, or the wait list for services is very long. In general, the project team learned that there is no standardized practice across LIAs for how home visitors identify services within their community.

As the logic model illustrates, understanding the complex referral process requires information about how strong community connections are built, how home visitors effectively identify clients' needs, and how clients are connected to community service providers and ultimately receive the care they need. This level of detail, however, requires access to robust data on referral processes. Although these data are not uniformly gathered by every home visiting model or MIECHV LIA, and therefore do not currently exist at a national level, there are a few examples of local efforts to gather this level of detailed information.

These efforts to learn more about the referral process in home visiting tend to be limited in scope. For example, some efforts are focused only on health care, while others may be limited to one state or city. These limits make it difficult to draw comparisons between LIAs or states. However, as the team learned from the stakeholders, it is important to develop a more nuanced understanding of the home visiting referral process to better support home visitors with making community connections, and to develop targeted approaches for directing resources (e.g., funding services in areas where they currently do not exist).

### G. 2. Stakeholders want more information about community connections in the home visiting context

Given the complexities of the referral process and the dedication of stakeholders to serving families well, it is not surprising that stakeholders are interested in learning more about relationships between home visiting programs and community service providers. The user stories showed that stakeholders are

interested in learning more about both the supply of and demand for community services. For example, one user story reads, *“As a social justice advocate, I would like to understand where families’ needs really are in my state, so I can understand not just the supply side, but also the demand side as I apply for grants.”* Other stakeholders indicated that accessibility of these services at the LIA, state, and national levels is important. An example user story on this topic states, *“As a state administrator, I would like to have data [such as referrals out by race, providers offering services in Spanish, referral completion rate by race] to help me understand why the rate of maternal mortality among non-black Hispanic women in my state is increasing. This would help me explain to our state’s new administration what we’re missing.”* Furthermore, stakeholders would like to learn about how these metrics change over time, so they can better target services and track their progress toward their goals. For example, a user story reads, *“As a researcher and tool developer, I would like to be able to learn from the tool over time, so that we can understand whether the services and grants we set up in a community are the things the community really needs.”*

As described in the methodology section, the needs stakeholders expressed in user stories guided the search for data sources. While some user stories signaled a need for visualizations and more complicated analyses, the essence of most user stories involved a strong desire for data that stakeholders did not already have. Consider the following user stories, with the desired data indicated in bold text:

- As a tribal TA provider, I would like to be able to see **a list of service providers with which my grantees have a memorandum of understanding [MOU]**, so that I can tell if having an MOU [versus a less formal relationship] is a factor in how often families are referred to those providers.
- As a tribal TA provider, I would like to be able to know who **the current, best “point people” are at a service provider**, so my home visitors know they have a credible contact to send a family to who will follow up with the program.
- As a model developer, I would like the tool to provide **an accurate list of all resources in my community**, so home visitors can refer families with confidence that the service is still open and still provides what is needed.
- As a state administrator, I would like to know **which providers are held in high regard by peer partners**, so that as my LIAs refer families to certain providers, they can consider that a family has given that provider a “marker of trust.”

These stories suggest that stakeholders are interested in in-depth data to describe the process for service coordination in home visiting programs. Understanding the needs of stakeholders helps move the field forward in terms of better supporting families served by home visiting programs.

### G. 3. A shift from complex analyses to more basic analyses

The team began this project with plans to incorporate the following complex analytic methods into the web-based tool:

- **Geomapping**, which uses data on the location of points of interest layered with other data, such as income or need for services in a geographic area. Geomapping allows users to identify geographic gaps in the availability of services.
- **Social network analyses (SNA)**, which are used to capture the characteristics of a network (such as a network of service providers in and around an LIA catchment area), the strength of the relationships that connect entities within the network, and how these relationships change over time.
- **Spatial discrete choice models**, which help describe, explain, and predict choices between two or more discrete alternatives (e.g., Do I refer this family to this provider or that provider?). The model estimates the probability that an individual chooses one option among a set of possible options.

As the project progressed through stakeholder engagement activities and an investigation of potential data sources, it became clear that basic analyses and visualizations were more appropriate than complex analyses. Stakeholders' interests (i.e., understanding the locations of community service providers, the services offered by service providers, the accessibility of service providers, and the gaps in existing services) could be answered primarily through a map interface, with summaries of key indices provided in reports. Although stakeholders did express interest in some basic elements of spatial discrete choice models and social network analyses, the data needed to conduct such analyses (e.g., the names of providers to which clients were referred) were not reasonably accessible.

It should be noted that users of the tool could pursue sophisticated analyses if the tool developer opts to make the underlying data available for download. With this ability, tool users could expand upon the tool's current functionality by downloading the underlying data and merging it with their own existing datasets. Depending on the level of geography in which the user is interested, data could be merged based on LIA name, county, or state/territory/tribal area.

#### *G. 3. a. Social network analysis*

SNA was initially viewed as important because of the project's emphasis on assessing connections between LIAs and community service providers. During the stakeholder interviews, stakeholders did not express an interest in having data that described their network. For example, stakeholders did not ask for a number, or score, to quantify how well they were connecting clients to all the community service providers in their community. Instead, they wanted to know about factors leading to stronger connections with individual providers. For example, stakeholders wanted to know whether having an MOU with a community service provider led to that service provider being used more often than other providers.

Unfortunately, data were not available to address these more practical applications of social network analysis even using basic analyses. Answering these questions requires the following types of data, at a minimum:

- the names of community service providers to which clients were referred, as well as the number of referrals each provider received
- details for every service provider that includes factors that may influence the use of the provider, such as whether an MOU is in place

The investigation of data sources revealed that neither of these data sources was reasonably accessible. Crowdsourcing this information would allow the web-based tool to include these analyses in the future.

### *G. 3. b. Spatial discrete choice models*

In the home visiting context, spatial discrete choice models can estimate what factors determine whether a service provider is used by an LIA (e.g., Do I refer clients to this service provider or another?). This model may identify factors that could contextualize data on service coordination/referrals, such as the influence of community service providers' capacity, details on the type of service provider, and geographical distance between the service provider and clients. These analyses could provide important predictive information for home visiting stakeholders, allowing them to improve their coordination of resources and referrals. For example, one of the user stories the team collected stated, *"How does the accessibility of community service providers relate to how often community service providers are used?"* The answer to this question would provide information about (1) the probability that a referral was made to a specific community service provider, among a set of other possible service providers, and (2) a list of factors that determine whether a referral was made to a service provider.

The stakeholder interviews revealed great interest in understanding factors that lead to whether a referral is made. Unfortunately, like the social network analyses, these spatial discrete choice analyses cannot be run without data on the names of community service providers to which clients were referred. Again, these analyses would be made possible if a crowdsourcing function in the web-based tool obtained these data.

### *G. 3. c. A shift to more basic analyses*

To respond to the needs of stakeholders while acknowledging the limitations of the currently available data, the web-based tool takes a simpler approach to helping users improve their connections to community service providers. For example, the proposed tool will let stakeholders see how many clients screened positive for certain issues, and how many clients received a referral for that need, using existing data that states gather in preparation for their reports to HRSA. The user of the tool can then view a list of community service providers in the LIA's service area to decide whether there are known factors that could influence home visitors' likelihood of referring to those providers. The tool will likely serve as a conversation starter for many LIAs, rather than a resource that tells users exactly how to improve their community connections. Even so, the stakeholders felt the prototype is a considerable improvement over what is currently available.

## H. Conclusion

Through a variety of activities including stakeholder engagement, a scan of the field, exploration of data sources, and more, the project team developed a prototype of a tool that seeks to enhance understanding of community connections in the home visiting context. If developed, the tool would allow users to see information about community providers on a map or in a report format and understand important context about the area served by a home visiting program. Despite limitations of the proposed tool, it represents a significant advancement over what is currently available at the national level.

Appendix G provides recommendations for implementing the proposed tool. The team hopes this information will facilitate the development of this tool at the national level.

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## Appendix A: User Personas



Donna: State Administrator

### *Background*

Donna has worked in home visiting (in the field and program administration) for 10 years and has a long history in her state. She manages a small team and oversees 20 grantee contracts.

Over time, she has built partnerships with the Department of Children and Families and the Office of Public Health, as well as many agencies and service providers across the state. She is a “connector” who is deeply invested in her work.

She is very comfortable with data and uses several online reporting systems/tools a few times per month.

### *Goals and Tasks*

Donna is responsible for overseeing quarterly reporting to HRSA, ensuring her grantees are meeting their benchmarks, and the reports meet quality standards. She sometimes is asked to provide data for legislative requests.

She attends quarterly Continuous Quality Improvement meetings with her team and reviews their progress and is always on the lookout for “bright spots” and successes to share. She will soon implement Help Me Grow in her state, which will entail additions to her toolbox for monitoring and reporting.

### *Environment*

Donna spends much of her time in meetings and conference calls. Her office is a busy one and “thinking time” at her desk is precious. She is pulled in many directions at once.

Her best day is one where she can meet with her community teams, get immersed in the learning, and see the providers grow and become champions of the work. She believes those in-person experiences allow her to report on her state’s progress in more real, and less abstract, terms.

### *Quote*

“It’s a lot of job. And we’re definitely stretched thin. But failure is not an option. Sometimes it can seem like we’re stuck. We have to come back and figure out what to do. How do we track and adjust? We may not know how we’re going to do it, but we know we’re going to get it done.”



## Charlotte: Federal Staff Overseeing State, Territory, and Tribal Programs

### *Background*

Charlotte has master's degrees in public health and social work. She has been with MIECHV since the legislation was proposed in 2009. Before that, she worked in early childhood systems for many years in her state. She brings a cross-sector, cross-agency perspective to her work.

She has a strong understanding of home visiting models and is very familiar with the policy environments across the region she now oversees.

### *Goals and Tasks*

Charlotte is responsible for all grant monitoring and meeting all MIECHV requirements. She is the point person to help her awardees be successful. She tries to check in with her awardees monthly, especially regarding the capacity of their LIAs. She relies on the Form 4 Quarterly Data Report for data about the number of families served and capacity of home visiting programs. Form 4 also helps her determine what the awardees need and often sparks dialogue about their challenges. She is also charged with budgetary oversight for her awardees.

### *Environment*

Charlotte oversees a region including a diverse range of communities—some urban and some very rural. It is not possible for her to meet with all of her awardees in person each year, which makes her job harder. She feels MIECHV is underfunded, so she works hard to help her states find solutions to make dollars go further. Her territory has issues with meeting benchmarks for referrals in and (especially in rural areas) out.

### *Quote*

“We know there are big gaps. A lack of pediatricians may impact how my awardees are doing with well-child checks. For referrals out, we try to encourage our awardees to use other methods: TA, tele-health, things like that.”



Maria: LIA

### *Background*

Maria is an advanced-practice social worker who has been in this field for 20 years. Her focus has always been public health. She has worked as a state investigator and has developed trainings in child welfare and for community health workers.

Today, Maria oversees a program focused on serving families, prenatal through age 5, which is housed in a large children's hospital.

### *Goals and Tasks*

Maria meets monthly with network coalition members to share best practices. They are investigating creating a database to track referrals among these agencies.

She tries to interpret data to inform her practice, but this is a challenge. She would like data on whether families are actually completing services; she has only client self-reports for now.

She tries to keep up with services in her area so she has the best contacts for warm hand-offs, but these continually change.

### *Environment*

Maria's office is situated inside a children's hospital, but her project's service area is county-wide. She also belongs to a core group of 20-25 such projects that make up a coalition that provides home visiting and center-based services.

Maria spends a lot of time in trainings and trying to make connections for families with needs for which there is no known resource.

### *Quote*

"We already report in three different systems—that is a lot of staff burden. It is very hard to get a good picture of your community...it is a big mish-mosh, so how am I supposed to find things and figure out the answers?"

## Appendix B: User Stories

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
1. As a tribal TA provider, I would like to be able to show my grantees a visual representation (like a map) of the resources close to them, so they can be prompted to contact service providers they might not normally default to.	✓	
2. As a tribal TA provider, I would like to be able to view information in a visually appealing interface, so that my grantees will be more likely to use and contribute to the tool or system.	✓	
3. As a tribal TA provider, I would like my grantees to be able to use the tool or system from their mobile device, because it is more likely they will adopt the tool/system if it is mobile-accessible.	✓	
4. As a model developer, I would like the tool to give me a visual for a gap analysis, because that would be very useful in my reporting and would make the case better than numbers alone.	✓	
5. As a tribal TA provider, I would like to be able to see a list of service providers with which my grantees have a memorandum of understanding (MOU), so that I can tell if having an MOU (versus a less formal relationship) is a factor in how often families are referred to those providers.		✓ MOU data are not reasonably accessible.
6. As a tribal TA provider, I would like to be able to know who the current, best “point people” are at a service provider, so my home visitors know they have a credible contact to send a family to, who will follow up with the program.		✓ Data to identify a "point person" are not reasonably accessible.
7. As a social justice advocate, I would like to see where all the service providers in my region are located so I can advocate for greater coverage.	✓	
8. As a social justice advocate, I would like to understand where families’ needs really are in my state (e.g., through a needs assessment report), so I can understand not just the supply side, but also the demand side as I apply for grants.	✓	

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
9. As a model developer, I would like the tool to provide an accurate list of all resources in my community, so home visitors can refer families with confidence to a service that is still open and still provides what is needed.		<p>✓ 2-1-1 data may not reflect real-time changes to a provider's status.</p> <p>Note that if the tool is ultimately able to use Google Places successfully (i.e., the search parameters can be refined to reduce the number of unrelated service providers who are returned during a search), then Google Places would offer more up-to-date and accurate information than 2-1-1, with the limitation that not all service providers will show up in Google Places, so a combination of data sources may be required.</p>
10. As a state administrator, I would like to be able to see whether substance-abuse disorder programs exist in areas where families in my state who need these services live. This will help me understand what the challenges really are when I hear LIAs are having trouble connecting families with these services.	✓	
11. As a state administrator, I would like clear information on the types of services a substance abuse disorder provider offers (e.g., Is it a residential program limited to moms with kids? What about dads with kids? Or families with one child and older teens?). This will allow me to better understand why some of our families are not being served.	✓	
12. As a model developer, I think the tool should always offer United Way as a go-to resource in communities where they operate, because they keep track of a lot of strong linkages to social service providers.	✓ United Way will be shown if they appear in 2-1-1.	

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
13. As a state administrator, I need to understand what mental health service providers' capacity is, so that I can reduce the wait time for families with significant mental health issues, many of whom currently wait more than a year for services.		✓ Capacity data are not reasonably accessible.
14. As a state administrator, I would like to know which providers are held in high regard by peer partners, so that as my LIAs refer families to certain providers, they can consider that a family has given that provider a "marker of trust."		✓ Quality data are not reasonably accessible.
15. As a state administrator, I want an Open-Table-like function, so my home visitors do not have to spin their wheels calling 20 different locations to find an available service. This would help me reduce the frustration for my home visitors, who work intensely with families and feel compromised when they cannot find an appropriate resource (e.g., one that has openings and eliminates child care concerns).		✓ An Open-Table-like function would require a level of effort from community service providers that the project team does not think is feasible.
16. As a state administrator, I would like to be able to track referrals all the way through (referred, accepted or rejected, completed or suspended, or no referral made), so that I can help follow up and ensure we are meeting our performance measures.		✓ Data on the referral process are not reasonably accessible.
17. As a tribal TA provider, I would like to be able to track whether a referral was received and the family was contacted, so I could have an opportunity to help ensure the loop is closed and the family is receiving services.		✓ Data on the referral process are not reasonably accessible.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
18. As a state administrator, I would like to consider who gets referrals through a racial equity lens, so that I can build awareness of any disparities in service provision.	✓ Partially addressed. Referral data are only available for a subset of service types and cannot be disaggregated by client race within an LIA. The tool can nonetheless be used to understand racial equity in referrals by comparing referral numbers across LIAs within a state that have different racial compositions, to determine whether there may be inequities within the state.	
19. As a state administrator, I would like to see data on the reasons why families do not connect with substance-abuse service referrals. This would help me understand if it is stigma, opioid issues, poor partnering with the resource, lack of child care, or just outside of the family's comfort zone.		✓ Standardized data about families' experiences with providers do not exist.
20. As a state administrator, I would like to see a list of barriers that keep referrals from "sticking," so that I can go back to the provider (or a community meeting) and say, "You lost 10 referrals this month because you do not take X insurance or speak Y language."		✓ Data with the specific provider to which each client was referred are not reasonably accessible, and data with the actual barriers experienced by clients do not exist.
21. As a tool developer, it would be good if a tool could "nudge" (e.g., via email or text) the family if the referral has not yet been taken up, because this might improve referral acceptance and success rates.		✓ Data are not reasonably accessible for: (1) provider to which a client was referred, (2) whether the client followed through with the referral.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
22. As a state administrator, I want to understand the voices of our families through their direct feedback on the process. Right now, we collect their stories anecdotally. If we had an intentional feedback loop, we could make improvements from the ground up instead of top-down.		✓ The project team decided that the maintenance requirements needed to crowdsource data from families would be too high.
23. As a researcher, I would like to know how many services a family actually uses (sessions or services completed), so that we could finally have good data for continuous quality improvement.		✓ Data are not reasonably accessible for: (1) provider to which a client was referred, (2) whether the client followed through with the referral.
24. As a state administrator, I would like to understand why some families reject referrals, so I can bring in more trainings and implement better techniques (e.g., motivational interviewing) to overcome their barriers to participation.		✓ The project team decided that the maintenance requirements needed to collect data from home visitors and families would be too high.
25. As a state administrator, I would like to have data (such as referrals out by race, providers offering services in Spanish, referral completion rate by race) to help me understand why the rate of maternal mortality among non-black Hispanic women in my state is increasing. This would help me explain to our state's new administration what we're missing.	✓ Partially addressed. Referrals are only available for a subset of service types and cannot be disaggregated by client race or language. However, state administrators can compare outcomes of LIAs with different racial or language compositions to understand how clients in LIAs with various compositions are faring.	

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
26. As a state administrator, I want to understand “the what and the why.” When some counties in my state have poor engagement in referrals out, and others do not, what is missing and why is it causing the problem? This will help me explain: Do some counties have poorer engagement because of factors like lack of available resources, travel distance/transportation, or lack of community hub meetings?	✓	
27. As a state administrator, I would like to be able to get a quick report that is in a user-friendly format—a quick story—so that I can provide a legislator with data that is easily understandable, so they can advocate for our programs.	✓	
28. As a researcher and tool developer, I would like to be able to learn from the tool over time, so that we can understand whether the services and grants we set up in a community are the things the community really needs.	✓	
29. As a researcher, I would like to understand if certain features of the relationship between an LIA and a provider have a better return on investment than others (e.g., do MOUs or semi-annual face-to-face meetings with providers really pay off?). This information will advance my research and help me promote better practices.		✓ Data on MOUs and other features of the relationship with providers are not reasonably accessible.
30. As a researcher, I would like the tool to be able to report whether LIAs’ contract capacity is in the right geographies to serve the communities’ needs. Frequently when contracts were signed, the need was here. Now it’s somewhere else. This would allow me to reassess my contracts and move the services where they are most needed.	✓	
31. As a tribal TA provider, I would like to see how successful LIAs and tribes (that are meeting performance measures) operate. Are they using central intake systems? Coordinated systems? Collaborative systems? Knowing these indicators would give me insights into how to improve systems in my region.		✓ Data about the systems used in each LIA, such as centralized intake, are not reasonably accessible.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
32. As a model developer, I would like a measure of family satisfaction with the referral to be built in, because family satisfaction is a big predictor of future successful referrals.		✓ The project team decided that the maintenance requirements needed to crowdsource data from families would be too high.
33. As a state administrator, I would like to see which providers have had long-term relationships with families. Since we know long-term relationships are an indicator that families trust and value a provider's services, this measure will help LIAs make referrals out with greater confidence.		✓ The project team decided that the maintenance requirements needed to collect data from home visitors, families, or providers would be too high.
34. As a state administrator, I would like to capture indicators of success including "child in day care," "parent employed," "moved into larger home," and others, so we have a broader base for understanding what constitutes a success.		✓ Data with these indicators are not reasonably accessible, and the project team decided that the maintenance requirements needed to collect data from home visitors would be too high.
35. As a state administrator, I would like to understand the protective factors at play when we refer a family, because things like social support are measurable and have a real impact on our work.		✓ Data on the family's protective factors are not reasonably accessible, and the project team decided that the maintenance requirements needed to collect data from home visitors or families would be too high.
36. As a researcher, I would like to better understand which "active ingredients" the most successful systems have in abundance, so that I can better promote health, well-being, and equity in early childhood systems. ("Active ingredients" were defined as features or traits of a system, e.g., the experience level of the person making the referral, the nature or length of the relationship with the family, etc.)		✓ Data on "active ingredients" are not reasonably accessible, and the project team decided that the maintenance requirements needed to collect data from home visitors would be too high.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
37. As a tribal TA provider, I would like to share stories and successes across LIAs, states, and tribal communities, so that we may all connect and learn from one another.	✓ Partially addressed. Users can create reports that demonstrate successes. The tool will not allow users to connect with one another virtually, nor will it explain why successes occurred.	
38. As a state administrator, I would like to identify a list of providers in my state who would be interested in working together on common approaches to solving community problems/cross-training. This would allow me to better reach out to these providers when I am planning a training (e.g., around the topic of trauma-informed care practices).		✓ Community service providers are not a user group for this tool so it will not allow community service providers to indicate their interest in working with the home visiting program.
39. As a state administrator, I would like to use the tool to help support relationships among providers (e.g., by making data more transparent or making reports and best practices easier to share), so that my network of providers can more successfully form synergies to better help families.	✓	
40. As a state administrator, I would like to find a way to track and learn from how we engage with families and overcome the things that stand in the way of their accessing services. For example, families with a depressed parent are less likely to access help. However, we may be able to find a way to get them help through at-home cognitive-behavioral therapy. This data would help me understand the infrastructure that evolves over time to meet families' needs.		✓ Data that tracks whether families followed through with a referral and data on the methods by which home visitors interact with individual families are not reasonably accessible.
41. As a researcher, I would like the tool to allow providers to know and contact each other, so that they could network and leverage each other's capacity.		✓ Community service providers are not a user group for this tool, so the tool will not include functionalities for community service providers.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
42. As Federal staff, I'd like to know how many formal service providers are available in each performance measure area, within an LIA service area, so that I can see (1) which performance measure areas have no providers, and (2) where providers are located relative to families.	✓	
43. As Federal staff, I'd like to see if there are patterns within a state or across states regarding gaps in the availability of community services to provide needed services, so that I can identify statewide or regional trends.	✓	
44. As Federal staff, I'd like to understand how accessible community resources are in each performance measure area, in each community, in terms of (1) client transportation, (2) proximity to at-risk communities, (3) hours of operation, (4) client eligibility criteria, and (5) safety of the location. This will help me understand some of the possible barriers to service families are facing in the region I oversee and fund.	✓ Partially addressed. Crime data will not be included. Eligibility criteria are included to the extent that community service providers include this information in their 2-1-1 listing.	
45. As Federal staff, I would like to know whether, within a single service type (e.g., mental health), community providers are being utilized equally, or whether some providers are more likely to be referred to than others. This will help me get a picture of which resources are potentially over-utilized, or to identify where new resources should perhaps be located and funded.		✓ Data with the specific provider to which each client was referred are not reasonably accessible.
46. As Federal staff, I'd like to know whether clients (families) with needs get a referral for that need. This will allow me to know whether grantees are making referrals as they should be.	✓ Partially addressed. Referral and screening data are only available for a subset of service types.	

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
47. As Federal staff, I would like to understand how metrics of interest change over time. This will allow me to know if there are patterns of change that are concerning and merit an intervention; this will also allow me to know if initiatives are succeeding.	✓	
48. As Federal staff, I want to understand how urbanicity/rurality is related to availability of needed services. This will help me to better spot trends and allocate grant funds in future.	✓	
49. As Federal staff, I'd like to know if either of the following two factors predict successful implementation of referrals (operationalized as "a person with a need gets a referral for that need") in home visiting, so that I can determine the importance of these two factors and allocate time and funds appropriately: <ul style="list-style-type: none"> <li>• availability of providers</li> <li>• density of network in a particular performance measure area (outcomes reported by MIECHV awardees to the federal government)</li> </ul>	✓ Partially addressed. Specifications include the number of clients with a need, and the number of clients who get a referral, for a subset of service types. However, it will be up to the user to interpret the impact of the two factors.	
50. As a system administrator, I would like a Terms of Use (TOS) statement on the site, so that users can clearly reference the rules of using the tool.	✓	
51. As a system administrator, I would like a secure, two-factor login system for users, so that only approved users may access the tool.	✓	
52. As a system administrator, I would like a means for users to be vetted and approved for access to the tool, so that unintended users cannot access the tool.	✓	
53. As a system administrator, I would like a method for users who have forgotten their passwords to be issued a temporary password (and then to reset their password), so that no humans need to manage this process.	✓	

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
54. As a system administrator, I need the ability to delete users, so that users who violate TOS or have left the employment of an authorized entity (LIA, grantee, state or federal government office) can be barred from its use.	✓	
55. As a system administrator, I would like to be able to add users manually, so that if the user-approval process gets stymied or runs slowly, in a pinch I can add a user and issue them credentials myself.	✓	
56. As a system administrator, I would like the tool to have a bug reporting/ticketing system, so that users can report issues they are experiencing, and a system administrator can investigate and address the problem.	✓	
57. As a system administrator, I would like users to have levels of permission to access the system, so that some users can add/update data to the back end of the system, others can only see the front-end user interface, and still others can access everything about the system.	✓	
58. As a system administrator, I would like the system to use Google Maps to support mapping functionality, so that I will easily be able to access Google Maps' online knowledge base to troubleshoot any problems or expand how the tool uses mapping.	✓	
59. As a system administrator, I would like the tool to utilize Bootstrap <sup>24</sup> or a similar front-end framework for ease of development and delivery of a responsive design.	✓	
60. As a system administrator, I would like data behind the tool to be updated on a routine basis (for example, quarterly), and for the "last updated" date to be published on the site, for planning and transparency purposes.	✓	

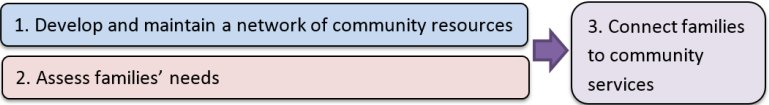
<sup>24</sup> Bootstrap is a free, front-end framework that affords faster and easier web development. Bootstrap includes responsive design templates for typography, forms, buttons, tables, and other website elements.

User Story	Addressed by Proposed Tool?	Cannot Address due to Data or Processing Limitations
61. As a system administrator, I would like the tool's web application framework to be updated often enough to at least keep pace with major releases (once every 2-3 years), so that the tool remains functional in the latest browsers and in accordance with the latest plugins and security requirements.	✓	
62. As a system administrator, I would like the stakeholders to think now about a sunset date for the tool as being, at most, 10 years from its launch date, so that no one believes this tool will run forever without a major overhaul to accommodate changes in technology and the technological environment.	✓	
63. As system administrator, I need a tool that is 508-compliant, so that it is not operating in violation of federal government requirements.	✓	
64. As a system administrator, I need a way to pull user statistics from the tool, such as login time, time active on tool, tasks performed (reports run, or maps created), and logout time, so that I can report on the tool's userbase and most-performed tasks.	✓	

Appendix C: Logic Model

Part 1: Develop and maintain a network of community resources

**Part 1 Objectives:** (1) The home visiting (HV) program will be embedded in the community’s early childhood system, and (2) the HV program will have strong ties with all community service providers in the area.



Inputs	Activities	Outputs	Outcomes
<div>1. Policy context that supports home visiting, which may include:<div>a. Coordination of referrals</div>b. Early childhood systems buildingc. Required collaborations with certain organizationsd. Policies that respond to shifts in the need for home visiting overall, and in certain topic areas of need</div> <div>e. Local policies (e.g., county and school district) that support home visiting and/or community resources</div> <div>2. Service model:<div>a. Qualifications for hiring staff (e.g., education level and/or relevant experience)</div>b. Competencies expected of home visitors (e.g., collaboration with partners)</div> <div>c. Caseload limits to ensure staff are not overwhelmed</div> <div>d. Clear scope regarding which services fall under direct service provision as opposed to being handled via referrals</div> <div>3. Implementation system</div> <div>4. Staff development (training, supervision, evaluation, and feedback) regarding:<div>a. The identification of community resources, e.g., through existing technologies and other tools</div>b. The process of collaborating with community resources</div> <div>5. Administrative supports for staff, including an effective system for recording, updating, and sharing details on community resources</div> <div>6. <b>Available</b> local resources in every area of the community’s needs:<div>a. (e.g., Maternal health care, substance abuse, depression, material needs including food, housing, diapers [availability measured as presence/absence])</div>b. The needs addressed by local resources should match the specific needs of the community</div> <div>7. <b>Accessible</b> local resources in every area of need:<div>a. (e.g., Proximity to clients, hours of operation, client eligibility criteria, perceived safety of the location, capacity [staffing expertise, waitlists], fit with clients [language appropriateness, perceived match of race/ethnicity of agency staff or clientele], cost/sliding scale fee, insurances accepted)</div><div>8. <b>High-quality</b> local resources in every area of need:<div>a. (e.g., Agencies that successfully engage families, deliver services as expected, communicate well within any existing systems such as centralized intake, communicate well with home visitors)</div></div></div>	<div>1. Identify community resources through one or more of the following:<div>a. Coordinated/centralized/collaborative intake, which may include:<div>i. Partnerships at the MIECHV awardee level</div>ii. Early childhood systems coordination efforts (HRSA’s Early Childhood Comprehensive Systems, [ECCS], SAMHSA’s Systems of Care grants, Help Me Grow’s systems model)</div>iii. Formal agreements with Women, Infants, and Children (WIC) clinics, hospitals, schools, child welfare agencies, prenatal clinics, health departments</div> iv. Centralized intake systems in some cities and states to make referrals into home visiting and other early childhood services <div>b. Other community partnership-building</div> <div>c. Statewide provider database to facilitate identifying community resources</div> <div>d. 2-1-1 system or paper-based resource manuals</div> <div>e. Personal networks</div> <div>f. Potential cross-sector collaboration activities (e.g., co-location of staff, conjoint training, and shared funding)</div> <div>2. Develop formal MOUs with community resources</div> <div>3. Maintain a point of contact with each community resource</div> <div>4. Develop trusting relationships with community resources</div> <div>5. Regularly review resources and update information</div> <div>6. Develop a reputation for high-quality service</div> <div>7. Actively ensure that the HV program is seen as influential in the community (e.g., as a primary support system for low-income parents)</div> <div>8. Identify community resources that are <b>not</b> currently working with the HV program and determine if and how they can be engaged</div>	<div>1. Number and percent of community resources that have formal ties with the HV program, within each service area reflecting a community’s specific needs (e.g., mental health, housing)</div> <div>2. Inclusion of community resources in an accessible index/resource database/tool, which is frequently updated and describes availability, accessibility, and quality</div> <div>3. Up-to-date information about community resources</div>	<div>1. HV program will be embedded in the community’s early childhood system</div> <div>2. HV program will have strong ties with all community service providers in the area</div>

b. Other community partnership-building

c. Statewide provider database to facilitate identifying community resources

d. 2-1-1 system or paper-based resource manuals

e. Personal networks

f. Potential cross-sector collaboration activities (e.g., co-location of staff, conjoint training, and shared funding)

2. Develop formal MOUs with community resources

3. Maintain a point of contact with each community resource

4. Develop trusting relationships with community resources

5. Regularly review resources and update information

6. Develop a reputation for high-quality service

7. Actively ensure that the HV program is seen as influential in the community (e.g., as a primary support system for low-income parents)

8. Identify community resources that are **not** currently working with the HV program and determine if and how they can be engaged

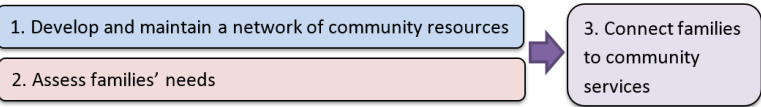
**Part 2 Objective:** The HV program will accurately identify a family’s needs.



Inputs	Activities	Outputs	Outcomes
<div>1. Service model:<div>a. Qualifications for hiring staff (e.g., education level and/or relevant experience)</div><div>b. Competencies expected of home visitors (e.g., ability to build trust with families to identify needs)</div><div>c. Caseload limits to ensure staff are not overwhelmed</div><div>d. Clear scope regarding which services fall under direct service provision, as opposed to being handled outside of home visits via referrals</div><div>e. Frequency and timing of visits by home visitors</div></div> <div>2. Implementation system:<div>a. Staff development (e.g., training, supervision, evaluation, and feedback) regarding the use of results from screeners, including a protocol for supporting families when there are no local services to address a particular need</div><div>b. Administrative supports for staff:<div>i. An effective record-keeping system (e.g., electronic records)</div></div><div>c. Guidance from the LIA and/or service model on a set of indicators that must be assessed, even if local community services do not exist to serve a particular need</div><div>d. Clinical supports:<div>i. Screeners, assessments, and checklists available with clearly defined thresholds/eligibility criteria, including assessments of:<div>1. Parenting capacity (e.g., environmental measures, such as lead in the home; direct observations of parent-child interactions)</div><div>2. Child development (e.g., socio-emotional, up-to-date well-child visits)</div><div>3. Maternal indicators (e.g., mental health, tobacco use, intimate partner violence, substance use, completion of a post-partum medical visit, educational attainment)</div></div><div>ii. Mandatory reporter status</div><div>iii. Clinical support staff (e.g., infant mental health)</div></div><div>e. Availability of enrollment/intake data:<div>i. Key descriptive factors (e.g., child’s date of birth, full-term/pre-term status; mother’s date of birth, number of prior births, residential address/ZIP; maternal demographics and contact with father)</div><div>ii. Other factors, such as family income, use of other public services (e.g., WIC and Temporary Assistance for Needy Families), child welfare data (history of domestic abuse or violence in the home, foster care, homelessness), information from agency that referred family to HV program (e.g., why they were referred)</div></div></div>	<div>1. Conduct ongoing assessments, screenings, and two-way discussions with the family to:<div>a. Identify a family’s needs</div><div>b. Describe parents’ <i>predisposing</i> and <i>enabling</i> factors (e.g., knowledge, attitudes, beliefs about the use of specific services)</div></div>	<div>1. Number of families assessed</div> <div>2. Number of families identified as needing outside resources</div>	<div>1. HV program accurately identifies a family’s needs</div>

Part 3: Connect families to community services

**Part 3 Objectives:** (1) Parents have increased knowledge of available resources, (2) parents engage with community resources to obtain services that are not provided by the HV program, and (3) families are empowered to meet their own goals.



Inputs	Activities	Outputs	Outcomes
<div><div>1. From Part 1<ul style="list-style-type: none"><li>HV program is embedded in the community's early childhood system</li><li>HV program has strong ties with all community service providers in the area</li></ul></div><div>2. From Part 2<ul style="list-style-type: none"><li>HV program accurately identifies a family's needs.</li></ul></div><div>3. Policy context that supports home visiting, which may include:<ul style="list-style-type: none"><li>State or federal policies that require home visitors to make and follow up on service referrals</li><li>State or federal policies that establish a timeline for home visits and following up on referrals</li></ul></div><div>4. Service model:<ul style="list-style-type: none"><li>Qualifications for hiring staff (e.g., education level and/or relevant experience)</li><li>Competencies expected of home visitors (e.g., ability to identify appropriate referrals)</li><li>Caseload limits to ensure staff are not overwhelmed</li><li>Clear scope regarding which services fall under direct service provision as opposed to being handled outside of home visits via referrals</li><li>Clear guidance on the services that staff should prioritize for parents</li></ul></div><div>5. Implementation system for outcomes related to coordination and referrals:<ul style="list-style-type: none"><li>Staff development (training, supervision, evaluation, and feedback) regarding the processes of (1) identifying services to best meet the family's needs and (2) facilitating referrals</li><li>Administrative supports for staff, such as an effective record-keeping system (e.g., electronic records) or data reporting and data sharing requirements</li></ul></div><div>6. Staff attitudes<ul style="list-style-type: none"><li>Home visitors perceive that their role is to refer families to specific services</li><li>Home visitors are comfortable handling specific issues and making referrals</li><li>Home visitors believe they have ready access to a strong bank of quality resources for referrals</li></ul></div></div>	<div>1. Develop trusting relationship with the family; understand family's culture and fear of stigma</div> <div>2. Build parent knowledge regarding:<ul style="list-style-type: none"><li>Benefits/importance of addressing this problem (e.g., depression, substance abuse)</li><li>Ways to overcome barriers to accessing resources (e.g., insurance options, transportation options)</li></ul></div> <div>3. Identify local resources for family:<ul style="list-style-type: none"><li>Consider match between resources and the parent (e.g., Does the resource match the parent's transportation, child care, and cultural/linguistic needs? How will the distance, hours, cost, etc. work for the parent? Is there a waitlist?)</li><li>Strike a balance between the quality of the service and the need for accessible services</li><li>Consider informal (e.g., faith-based) as well as formal services, depending on family's needs</li></ul></div> <div>4. Make referrals:<ul style="list-style-type: none"><li>Referrals are based on the needs identified by the home visitor, and the accessibility and quality of the resource (e.g., operating hours meet the family's needs, cost is feasible or paid for by the HV program)</li></ul></div> <div>5. Conduct activities to increase parents' use of referred services, which may include:<ul style="list-style-type: none"><li>Home visitor going with the parent ("warm handoff")</li><li>Transportation support (e.g., bus tokens, ride)</li><li>Motivational interviewing</li><li>Focus on family empowerment</li></ul></div> <div>6. Coordinate services:<ul style="list-style-type: none"><li>All referrals are tracked</li><li>There is follow up with client to:<ul style="list-style-type: none"><li>Determine if referral was used (may utilize an existing system that facilitates communication between HV program and community services to which parents are referred)</li><li>Understand why service referral failed, if this is the case</li><li>Provide new referrals if need remains unmet</li></ul></li></ul></div> <div>7. Learn from the process, which may include:<ul style="list-style-type: none"><li>Home visitor recording notes on the experience with the community service</li><li>Obtaining a "review" from the family</li></ul></div> <div>8. Work with community service providers to understand why families may not be engaging in their services; help service provider adapt services as needed</div>	<div>1. Number of parents receiving referrals</div> <div>2. Number of referrals initiated (e.g., an attempt was made to set up an appointment)</div> <div>3. Number of referrals for which an appointment was made and the mother/family attended</div> <div>4. Number of programs reporting to HV program that a referred service was completed</div>	<div>1. Parents have increased knowledge of available resources</div> <div>2. Parents engage with community resources to obtain services not provided by HV programs</div> <div>3. Families are empowered to meet their own goals/needs</div> <div>4. Parents can reach out to home visiting provider with questions or for assistance connecting with referrals</div>

## Appendix D: Recommended Data Sources and Pros and Cons of Each Source

**Table D1. Publicly Available Data**

Data Needed	Recommended Data Source	Pros	Cons
<b>Lists of community service providers</b>	<ul style="list-style-type: none"> <li>2-1-1 (data: all types of service providers)</li> <li>SAMHSA treatment facility locator data (data: mental health providers and substance abuse treatment providers)</li> </ul>	<ul style="list-style-type: none"> <li>2-1-1 and SAMHSA data are publicly available for every U.S. state</li> <li>2-1-1 and SAMHSA only include community service providers after a person reviews the provider's information, increasing the likelihood that listed providers will be useful</li> <li>SAMHSA data are available for U.S. territories</li> <li>SAMHSA data are organized in an easy-to-access CSV file</li> <li>SAMHSA data are updated at regular intervals. Interim updates are also made at the request of community service providers.</li> </ul>	<ul style="list-style-type: none"> <li>2-1-1 is not available for U.S. territories</li> <li>In 2-1-1, provider lists and relevant information are often outdated</li> <li>Anecdotally, the project team has learned that some 2-1-1 websites may limit data to United Way grantees</li> <li>For 2-1-1, addresses are not shown for some providers, such as shelters. In addition, services may be provided at a location other than the physical address of the provider that is listed in 2-1-1.</li> <li>2-1-1 websites vary by locale, so the usefulness of the information will vary widely. For example, some locales do not categorize their services. There is also a lack of uniformity of service categories across sites that do categorize. There are also inconsistencies across localities in terms of how providers are selected to appear on 2-1-1 websites.</li> <li>In the 2-1-1 systems the project team explored, it appears that community service providers enter their eligibility requirements in a free-text field; in other words, there is no systematic categorization of eligibility requirements.</li> </ul>

Data Needed	Recommended Data Source	Pros	Cons
<b>Index of neighborhood disadvantage</b>	Area Deprivation Index (ADI) at the U.S. Census Bureau block group level	<ul style="list-style-type: none"> <li>• The ADI is publicly available</li> <li>• The ADI has been associated with outcomes of interest to home visiting, such as mortality rates among women of child-bearing age, low birthweight, and prenatal health (Singh, 2003; Lantos et al., 2017)</li> <li>• The ADI provides data at the neighborhood level</li> </ul>	<ul style="list-style-type: none"> <li>• The ADI will eventually become outdated. It is unclear whether the ADI will be updated by the entity that currently maintains it. The developer of the web-based tool may need to create an updated ADI, which would involve analysis of data from the U.S. Census Bureau.</li> <li>• The ADI is not available for territories other than Puerto Rico</li> </ul>
<b>Urbanicity of LIA service areas</b>	U.S. Census data with the principal city (or cities) of metropolitan statistical areas (MSAs), to use in combination with geographic boundaries of MSAs and counties	<ul style="list-style-type: none"> <li>• Allows users to distinguish suburban counties from urban and rural counties</li> <li>• Publicly available</li> </ul>	<ul style="list-style-type: none"> <li>• Urban, suburban, and rural codes are not pre-made. Instead, the tool developer will need to use geomapping to determine the county within which each MSA's principal city is located.</li> </ul>

Data Needed	Recommended Data Source	Pros	Cons
<b>Geographic boundaries for mapping (shapefiles)</b>	<p>Cartographic Boundary Keyhole Markup Language (KML) Files from the U.S. Census Bureau, to include boundaries for: block groups, tracts, American Indian/Alaska Native Areas/Hawaiian Home Lands, zip codes, states, congressional districts, metropolitan statistical area (MSA), incorporated places and census designated places, and counties</p> <p>Note: Many of these shapefiles have been incorporated into Google Maps and will thus be native to the tool platform. The tool developer should review the availability of these shapefiles in Google Maps before determining if it is necessary to obtain the KML files directly from the U.S. Census Bureau's website.</p>	<ul style="list-style-type: none"> <li>Publicly available</li> </ul>	<ul style="list-style-type: none"> <li>Use of data requires familiarity with geomapping</li> </ul>
<b>Transportation information</b>	Use Google Maps to obtain latitude and longitude for community service providers	<ul style="list-style-type: none"> <li>Publicly available</li> </ul>	<ul style="list-style-type: none"> <li>Moderate coding is required</li> </ul>

Data Needed	Recommended Data Source	Pros	Cons
<b>County risk indicators</b>	Use the various data sources that are described in HRSA's guidelines for state needs assessments	<ul style="list-style-type: none"> <li>Allows stakeholders to use an index with which they are already familiar</li> <li>HRSA already maintains these datasets for states</li> </ul>	<ul style="list-style-type: none"> <li>Some coding will be required</li> </ul>

**Table D2. Home Visiting Administrative Data**

Data Needed	Recommended Data Source	Pros	Cons
<b>Names and locations of all LIAs</b>	HRSA	<ul style="list-style-type: none"> <li>HRSA already maintains these data</li> </ul>	<ul style="list-style-type: none"> <li>Data will become outdated between annual updates from HRSA, as new LIAs are added and others close. Between annual updates, new LIAs will need to request that they be added to the tool.</li> </ul>
<b>Zip codes of clients</b>	State awardees to provide the LIA-level data they obtain to complete the state's Form 4. (Form 4 is the Quarterly Performance Report that MIECHV awardees are required to submit to HRSA. It focuses on quantifying staff and clients served.)	<ul style="list-style-type: none"> <li>Captures the area where current clients live</li> <li>Data are already being collected so that states can comply with HRSA reporting requirements</li> </ul>	

Data Needed	Recommended Data Source	Pros	Cons
<b>Client demographics</b>	State awardees to provide LIA-level data they obtain to complete the state's Form 1. (Form 1 is the Demographic, Service Utilization, and Select Clinical Indicators report that MIECHV awardees are required to submit to HRSA. It focuses on describing clients' demographics and other characteristics.)	<ul style="list-style-type: none"> <li>Data are already being collected so that states can comply with HRSA reporting requirements</li> </ul>	<ul style="list-style-type: none"> <li>Because demographic data is reported separately from screening and referral data, it is impossible to disaggregate screener results and referrals by demographic characteristics</li> </ul>
<b>Number of client referrals in each category (e.g., tobacco cessation)</b>	State awardees to provide LIA-level data they obtain to complete the state's Form 2 (tobacco referrals, child development referrals, intimate partner violence referrals, and depression referrals). (Form 2 is the Performance and Systems Outcomes Measures report that MIECHV awardees are required to submit to HRSA.)	<ul style="list-style-type: none"> <li>Data are already being collected so that states can comply with HRSA reporting requirements</li> </ul>	<ul style="list-style-type: none"> <li>Data will be limited to referrals in four categories (tobacco, child development, intimate partner violence, and depression). Referrals in housing and food assistance, early care and education, or other categories will not be included.</li> <li>Because demographic data is reported separately from referral data, referrals cannot be disaggregated by demographic characteristics</li> </ul>

Data Needed	Recommended Data Source	Pros	Cons
<b>Results from client screeners</b>	<p>State awardees to provide the LIA-level data they obtain to complete the state's Form 2 (number of positive screens for tobacco use, developmental delays, and intimate partner violence).</p> <p>Optionally, request from model developers the LIA-level data for depression and Life Skills Progression, if collected.</p> <p>Optionally, request from all LIAs LIA-level data for depression screens (LIAs are likely calculating this to obtain derived values for Form 2 reporting).</p>	<ul style="list-style-type: none"> <li>• Data are already being collected so that states can comply with HRSA reporting requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Data will be limited to screeners in three categories (tobacco use, developmental delays, and intimate partner violence).</li> <li>• If the model developers and/or LIAs provide additional screener data (e.g., data on maternal depression, education, employment, housing, food, child care), the tool developer will likely need to invest considerable resources in cleaning the data so that it is consistent across all locations.</li> </ul>

## Appendix E: Summary of Analysis Plan

Use Case	Analytic Strategy	Visualization
1. Identify Locations of Community Service Providers	Create LIA service area boundaries using client zip code data. Community service provider information, drawn from 2-1-1 data, will then be aggregated up from zip code-level to LIA-level. For each LIA's service area, calculate the total number of community service providers.	User sees their LIA service area's boundary on a Google Maps interface. All the providers are shown on the map, and the user can filter each service type on and off (e.g., substance abuse providers, mental health providers).
2. Obtain Accurate Information About County Risk Indicators	Calculate the risk indicators as recommended by HRSA for states' MIECHV needs assessments, which fall in the following domains: socioeconomic status, adverse perinatal outcomes, substance use disorders, crime, and child maltreatment.	LIA level: When viewing an LIA, the main page shows descriptive information for each of the risk indicators for the county in which that LIA is located. The descriptive information will be presented in a variety of user-friendly figures.
3. Identify Gaps Between Community Service Providers and Community Need	<b>LIA-level analyses:</b> Calculate the number of community service providers in each service type (i.e., mental health, substance abuse). Flag types of service providers that have no providers in the LIA service area.	<p>The map view includes a list of service provider types. Next to each type, the number of community service providers in that service type within the LIA, will be in parentheses. For example: "Substance Abuse Providers (11)."</p> <p>Reports from the tool will include a figure that highlights the service types for which there are no community service providers in an LIA service area. The tool will present this for urban, suburban, and rural areas separately.</p> <p>To give the user context for the needs (or potential needs) in the LIA, relative to the availability of service providers, include the following descriptive statistics at the top of the reports:</p> <ul style="list-style-type: none"> <li>• The number/percentage of clients in the LIA who screened positive on measures of tobacco use, developmental delays, and intimate partner violence.</li> <li>• The prevalence rates for alcohol, marijuana, pain medication, and other drug abuse in the county.</li> </ul>

Use Case	Analytic Strategy	Visualization
	<p><b>State-level analyses:</b> For each service type, calculate the proportion of LIA service areas in a state that have no local providers.</p> <p><b>National-level analyses:</b> Repeat the state analyses, but with LIAs from the country.</p>	For state- and national-level pictures, a bar graph will show each type of service providers as a separate bar. The bar will indicate the percentage of LIAs in the state (or nation) that have a service provider in the respective service type. The tool will present this for urban, suburban, and rural areas separately.
4. Understand Accessibility of Community Service Providers	<p>Calculate summary statistics of accessibility metrics in each category, within an LIA service area. There are numerous ways to convey access; the project team’s proposed approach for <b>client transportation</b> is presented below.</p> <p><u>Client transportation—Public transit:</u> For each type of service provider (e.g., substance abuse services), calculate the <b>proportion of community service providers in an LIA service area that are within a 10-minute walk of a metro station or bus stop.</b></p>	<p>Most of the visualizations for accessibility will be in reports that can be requested as part of the web-based tool; a few visualizations will be possible in the mapping screen. An example of the visualization strategy for client transportation is provided below:</p> <p><u>Client transportation—Public transit:</u> A map shows the LIA and the service providers. Users can select a filter that only shows providers within a 10-minute walk from a public transit stop. The map includes an option for the user to turn on shading that shows the location of disadvantaged neighborhoods. A report gives users summaries of the data.</p> <p>The information should be calculated separately for providers in high-risk areas and low-risk areas, so that the user can see whether providers in high-risk areas are less accessible. Visualizations should be available to compare high-risk and low-risk areas.</p> <p>For state- and federal-level analyses, provide visualizations of the data averaged within a state or across the country.</p>

## Appendix F: Technical Specifications

The Assessment and Mapping of Community Connections in Home Visiting (AMC-HV) tool will be accessible via web browsers, including mobile devices (tablets and smartphones). The technical stack will consist of an approved web application framework (specific suggestions below); a SQL database (NoSQL options could be used if deemed necessary for specific performance reasons); necessary caching mechanisms (Redis, memcache, etc.) to ensure adequate page load speeds; and a front-end display built in HTML/CSS/JavaScript (Flash or similar technologies may not be used) which utilizes Google Maps (Google Maps has been identified as the preferred map functionality based on a thorough review of available options). The tool must be accessible as defined by governmental Section 508 compliance standards. The tool should be hosted in a distributed or cloud environment to provide security and redundancy.

### 1. Selecting, maintaining, and updating source code

There are many technical options for developing the tool. One approach is outlined below, but there are many options based on a developer's experience and comfort level. The project team suggests:

1. Secure, redundant hosting at Amazon Web Services (AWS), using EC2 servers and a VPN environment for all site administrators.
  - a. Comparable services, such as Azure or Google, could also be considered. For AWS, at least two m5.xlarge instance types would be required, each located in its own availability zone, with traffic distributed via a load-balancer. The servers (other than ports 80/443) should not be available to the internet, other than via a private VPN at AWS.
  - b. A unique database server, also hosted at AWS. Backup snapshots should be taken at least daily, with a minimum of 14 consecutive days of backups stored before deletion.
2. Ruby on Rails (web application framework); see below for specific gems that would likely be required for a RoR project.
3. Unicorn (application server) and nginx (web server)
4. MySQL (database storage)
5. Redis, for in-memory caching and query reduction of third-party services

A developer may select certain preferred tools (Apache instead of nginx, for example). Those decisions are all acceptable if the functional requirements are met.

Other technical details and considerations include:

1. **Web application framework.** The project team recommends the use of a stable, *open-source* web application framework that has a large developer community and multiple support options. While there are several acceptable options, the team recommends **Ruby on Rails**. RoR is a well-established, easy-to-use framework that will scale effectively and offers many avenues for technical support. Currently, the latest stable release of RoR is version 5.2.1. Incremental version upgrades occur approximately quarterly and should be relatively easy to incorporate into the codebase. Major version upgrades occur approximately every 12-18 months and should

be assessed for functionality, backward-compatibility and important deprecations.

It should be expected that the framework code needs to be updated at least once every six months. Major version upgrades (e.g., from 5.x to 6.x) should occur within the same year as the upgrade is released in a stable (non-edge/beta) manner.

There may be compelling reasons (experience level, particular functionality) to use other frameworks; similar upgrade standards should be adhered to, based on the specifics of that framework's development cycle.

Other possible frameworks include but are not limited to Angular, Ember, Django, Drupal, ASP.net, etc. Demonstrated expertise and experience with similar projects in scope and content are expected.

2. **Third-party libraries and open-source code.** Rails-based applications will utilize third-party Ruby "gems" for particular functional requirements. In addition, the Google Maps API will be leveraged to display basic maps and data layers involving Census-based KML/shape files.

Documentation tracking each library/gem file should be maintained and reviewed quarterly. Most minor updates will be trivial, but major changes to Google's API are released on a periodic basis can result in more significant work. Changes to the code base pertaining directly to *third-party software* should be budgeted for quarterly and annually. Security issues may arise unexpectedly and need to be addressed more urgently.

Likely gems to be included: **Devise** (user management), **Pundit** (permissions/access), **Capistrano** (deployment), **jquery-rails** (front-end development), **prawn** (PDF generation), **rspec/cucumber/factory\_girl** (specs/testing suite).

3. **Code.** Custom code written by the tool's eventual development team will also need to be revised on a schedule. A good benchmark would be that 20-30 percent of the codebase will likely need to be reviewed (and possibly updated) every 12-18 months to keep up with industry/security practices and front-end trends. Some of these updates may stem from changes in the framework or third-party libraries, as described above. However, it's more likely that trends in front-end views or best practices will drive these updates to keep the tool effective and useful for its end users.

Total lines of custom code (absent code in points 1 or 2, above) could be calculated after the release of a minimum viable product (MVP). From this baseline, a percentage change could be calculated and budgeted for at least twice a year. It should also be assumed that functional requirements will be added as the tool evolves, although those changes would be budgeted separately as requirements are defined.

## 2. Managing users

As stated previously, the tool will have various user types:

1. Local implementing agencies (LIAs) staff
2. Federal staff overseeing state, territory, and tribal programs
3. State administrators
4. Tool managers and administrators

Only “accredited” users will be able to access the functional aspects of the tool. That is, users must have unique user accounts to log in and access the various mapping and reporting features of the tool itself.

There are many ways to handle user creation/management. In the case of Ruby on Rails applications, the standard method is to utilize the Devise Ruby gem. This gem supplies all the basics of user creation and management. Other options are also acceptable, provided they meet the following criteria:

1. **User vetting.** The tool will provide a means for which new users to request access. A form will be provided that will collect requisite information (name, email, agency, phone number, etc.). This form will notify a tool administrator upon each new request. Administrators will then be able to accept or reject this user “application.”
2. Accredited users must use **two-factor authentication (2FA)** to access the tool. Upon account creation, users will be prompted to set up this authentication before they are able to access the tool’s functionality. Various 2FA options are acceptable, though it is highly recommended that the tool requires an authenticator app (Google, LastPass, etc.) on a user’s mobile device. SMS notifications are no longer considered best practice and should not be used for this 2FA requirement. Other industry standards should also be considered.
3. **Passwords.** Password requirements should be incorporated. At a minimum, passwords should be eight characters long and require an upper-case letter, a lower-case letter, a numeric symbol, and a non-alphanumeric character. Longer passwords are encouraged and may be required, based on client specifications. Devise and other user management systems support these security requirements with minimal configuration.
4. **Password resets.** End users should be able to reset their passwords securely by requesting a password reset email, or similar functionality. Devise and other user management systems support this feature.
5. **User management.** Administrative users will be able to create, read, update, and delete user accounts in a secure interface within the tool. User creation should trigger an email to the registered user allowing them to set their own secure password.
6. **Access levels.** At a minimum, there will be two levels of user access – normal and administrative. Most users will be normal users of the tool, while administrative users will have the additional capabilities of user management detailed above. There may be further administrative privileges added from time-to-time, so the permissions system should be flexible enough to incorporate additional features without major development costs.

### 3. Other technical requirements

1. The site will be served using the secure socket layer (SSL).
2. Passwords should be securely hashed and not stored in plaintext.
3. In-memory caching should be used where appropriate to reduce load and query times for large datasets that are provided as data layers. For example, driving accessibility data (layering polygons over maps to display incremental driving times from a given location) should not be queried based on user actions, but should instead be pre-loaded based on configuration and displayed via an in-memory cache (e.g., Redis).
4. API query rate limiting should be reviewed and considered when implementing map functionality. For example, the current Google Maps API has tiered usage rates. The developer must be familiar with likely traffic scenarios and project query usage accordingly.
5. Transactional emails (account notifications, password resets, other email generated via the application) should be authorized via DKIM or a similar technology. Email delivery rates should be ascertainable (e.g., a system administrator should be able to confirm that a given message was sent to a specific user at a specific time).

### 4. Notes on 508 compliance

As stated, the final tool must be compliant with Section 508 of the Rehabilitation Act of 1973. Certain features will not be compliant by default unless additional care is undertaken to meet the requirements of the Act. Several of those features are outlined in Table F1, with possible remediation options. However, any of a number of methods could be employed to assure 508 compliance; these are merely options.

**Table F1. Considerations for 508 Compliance**

Functional Area	Possible Remediation Option
<b>Neighborhood Disadvantage Index and other data layers</b>	The Neighborhood Disadvantage Index layers information onto an existing map by displaying different portions of the map in a different shade/color. There are multiple 508 concerns with this functionality: 1) the color gradations must be easily distinguishable for users with poor eyesight; i.e., color contrasts must be distinct enough to differentiate areas; 2) the data layer must be available to a user employing assistive technology. In the case of the latter, each area index must also be presented as a text element that includes information distinguishing the area itself along with its index ranking. This could be done via a table with a column for the physical area and a column for the index rank. As with all tables in the interface, these should have column and row headers identified appropriately via <th> elements.
<b>PDF generation</b>	Users are able to save report filters and generate PDFs with customized information. It is expected that the developer will use a gem or third-party library to generate these PDFs. PDF downloads must be compliant, so any PDF generation technique must be developed with this requirement in mind.
<b>Risk indicator graphs</b>	Area risk indicators will be included on many pages. In the prototype, these indicators are displayed as bar charts with shaded areas denoting a percentage. This functionality shares the same 508 concerns as the Neighborhood Disadvantage Index (color gradations and assistive technology users). Similarly, the risk indicators must be made available in tabular or text format for those users. In this case, given the limited number of indicators, descriptive alternative text associated with the graphical element would likely be sufficient.
<b>Reporting/filter forms</b>	All form elements should include descriptive text for users of assistive technologies. For example, users generating a Longitudinal Comparison report should be presented with descriptive labels for all <input>, <textarea> and <select> elements they will interact with to customize the report.

## 5. Connections among prototype screens, data elements, and analyses

Table F2 shows the data elements and analyses needed for each screen shown in the “Proposed Tool” section, above.

**Table F2. Connections Among Prototype Screens, Data Elements, and Analyses**

Screen (from “Proposed Tool” section, above)	Data Elements Needed <sup>25</sup>	Analyses Used, Categorized by Use Case <sup>26</sup>
Figure 2. Opening screen	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> </ul>	<ul style="list-style-type: none"> <li>No analyses are on the opening screen</li> </ul>
Figure 3. State view	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> <li>Shapefiles with boundaries</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #1: Identify Locations of Community Service Providers and Understand which Services they Offer</li> </ul>
Figure 4. LIA menu	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> <li>Shapefiles with boundaries</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #1: Identify Locations of Community Service Providers and Understand which Services they Offer</li> </ul>
Figure 5. LIA view	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> <li>Shapefiles with boundaries</li> <li>Zip codes of clients served in the LIA</li> <li>County risk indicators</li> <li>Urbanicity</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #1: Identify Locations of Community Service Providers and Understand which Services they Offer</li> <li>Use Case #2: Obtain Accurate Information about County Risk Indicators</li> <li>Use Case #3: Identify Gaps between Community Service Providers and Community Need</li> </ul>
Figure 6. Service provider profile	<ul style="list-style-type: none"> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #1: Identify Locations of Community Service Providers and Understand which Services they Offer</li> </ul>
Figure 7. Provider list	<ul style="list-style-type: none"> <li>A list of all community service providers</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #1: Identify Locations of Community</li> </ul>

<sup>25</sup> Additional details can be found in Appendix D.

<sup>26</sup> See the analysis plan summary in Appendix E for details on each Use Case.

Screen (from “Proposed Tool” section, above)	Data Elements Needed <sup>25</sup>	Analyses Used, Categorized by Use Case <sup>26</sup>
	<ul style="list-style-type: none"> <li>Latitude and longitude of community service providers</li> </ul>	Service Providers and Understand which Services they Offer
Figure 8. Neighborhood Disadvantage Index	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> <li>Shapefiles with boundaries</li> <li>Zip codes of clients served in the LIA</li> <li>County risk indicators</li> <li>Urbanicity</li> <li>Area Deprivation Index</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #4: Understand Accessibility of Community Service Providers</li> </ul>
Figure 9. Drive-time accessibility of providers	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> <li>A list of all community service providers</li> <li>Latitude and longitude of community service providers</li> <li>Shapefiles with boundaries</li> <li>Zip codes of clients served in the LIA</li> <li>County risk indicators</li> <li>Urbanicity</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #4: Understand Accessibility of Community Service Providers</li> </ul>
Figure 10. Reports landing page	<ul style="list-style-type: none"> <li>No data are used on the reports landing page</li> </ul>	<ul style="list-style-type: none"> <li>No analyses are on the reports landing page screen</li> </ul>
Figure 11. Reports selections, Area Overview and Current Snapshot	<ul style="list-style-type: none"> <li>No data are used on the reports landing page</li> </ul>	<ul style="list-style-type: none"> <li>No analyses are on the reports landing page screen</li> </ul>
Figure 12. Report location menu	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> </ul>	<ul style="list-style-type: none"> <li>No analyses are on the “choose a location” screen.</li> </ul>
Figure 13. Choose a location for a report, LIA	<ul style="list-style-type: none"> <li>Names and locations of all LIAs</li> </ul>	<ul style="list-style-type: none"> <li>No analyses are on the “choose a location” screen.</li> </ul>
Figure 14. Example Area Overview/Current Snapshot report	<ul style="list-style-type: none"> <li>A list of all community service providers</li> </ul>	<ul style="list-style-type: none"> <li>Use Case #2: Obtain Accurate Information</li> </ul>

Screen (from “Proposed Tool” section, above)	Data Elements Needed <sup>25</sup>	Analyses Used, Categorized by Use Case <sup>26</sup>
	<ul style="list-style-type: none"> <li>• Latitude and longitude of community service providers</li> <li>• Shapefiles with boundaries</li> <li>• Zip codes of clients served in the LIA</li> <li>• County risk indicators</li> <li>• Demographic data on home visiting clients</li> <li>• Number of client referrals in each category</li> <li>• Results from client screeners</li> </ul>	<p>about County Risk Indicators</p> <ul style="list-style-type: none"> <li>• Use Case #3: Identify Gaps between Community Service Providers and Community Need</li> </ul>
Figure 15. Reports selections, Service Accessibility and Longitudinal Comparison	<ul style="list-style-type: none"> <li>• No data are used on the reports landing page</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the reports landing page screen</li> </ul>
Figure 16. Choose a location for a report	<ul style="list-style-type: none"> <li>• Names and locations of all LIAs</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the “choose a location” screen</li> </ul>
Figure 17. Choose years to compare	<ul style="list-style-type: none"> <li>• No data are needed on the “choose years” screen</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the “choose years” screen</li> </ul>
Figure 18. Choose years to compare, 2017 and 2018	<ul style="list-style-type: none"> <li>• No data are needed on the “choose years” screen</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the “choose years” screen</li> </ul>
Figure 19. Choose services	<ul style="list-style-type: none"> <li>• No data are needed on the “choose services” screen</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the “choose services” screen</li> </ul>
Figure 20. Choose services, substance abuse	<ul style="list-style-type: none"> <li>• No data are needed on the “choose services” screen</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the “choose services” screen</li> </ul>
Figure 21. Example Service Accessibility/Longitudinal Comparison report	<ul style="list-style-type: none"> <li>• A list of all community service providers</li> <li>• Latitude and longitude of community service providers and public transit stops</li> <li>• Shapefiles with boundaries</li> <li>• Zip codes of clients served in the LIA</li> <li>• Urbanicity</li> <li>• Area Deprivation Index</li> </ul>	<ul style="list-style-type: none"> <li>• Use Case #3: Identify Gaps between Community Service Providers and Community Need</li> <li>• Use Case #4: Understand Accessibility of Community Service Providers</li> </ul>

Screen (from “Proposed Tool” section, above)	Data Elements Needed <sup>25</sup>	Analyses Used, Categorized by Use Case <sup>26</sup>
Figure 22. Account menu	<ul style="list-style-type: none"> <li>• No data are needed to create drop-down menus to personalize the tool</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on the drop-down menu to personalize the tool</li> </ul>
Figure 23. Saved Maps/Reports	<ul style="list-style-type: none"> <li>• No data are needed to create this page</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on this page</li> </ul>
Figure 24. User profile	<ul style="list-style-type: none"> <li>• No data are needed to create this page</li> </ul>	<ul style="list-style-type: none"> <li>• No analyses are on this page</li> </ul>

## Appendix G: Recommendations for Implementation

This appendix presents one approach to building a tool to help understand community connections in home visiting.

### 1. Background

The Assessment and Mapping of Community Connections in Home Visiting (AMC-HV) tool will be used to better understand the community-level systems and networks in which the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program operates, including the availability of community service providers to which home visiting programs can refer families.

Users of the tool will include local implementing agencies (LIAs); federal staff overseeing state, territory, and tribal programs; state administrators; and others interested in improving home visitors' referrals to community providers. The tool will facilitate this goal through the use of targeted geomapping and pre-defined reports. Users will be able to identify community service providers via a combination of factors, including service location, service type (e.g., mental health, substance abuse), accessibility, and local needs (i.e., level of neighborhood disadvantage). Based on these various filters, tool users will be able to generate and save reports documenting targeted providers and providing certain insights surrounding provider availability and accessibility.

In summary, the tool will:

- Support LIAs in making referrals to community service providers
- Assist state and federal administrators in understanding the local context in which home visiting services are provided
- Help contextualize MIECHV performance measures

### 2. Initial development/build

#### 2. a. *Technical specifications*

The tool will be accessible via web browsers, including mobile devices (tablets and smartphones). The technical requirements to develop this application include a web application framework, a database, a means to ensure acceptable page-load speeds, and a front-end website that uses Google Maps. The tool must be accessible as defined by governmental Section 508 compliance standards. It should be hosted in a distributed or cloud environment to provide security and redundancy. See Appendix F for complete technical specifications.

#### 2. a. i. *Managing users*

As stated previously, the tool will have various user types:

- LIA staff
- Federal staff overseeing state, territory, and tribal programs
- State administrators
- Tool managers and administrators

Only invited or accepted users will be able to access the functional aspects of the tool. Users must have unique user accounts to log in and access the tool. The back-end administration features of the tool will allow for vetting and authorization of users, password setting, and user authentication. Appendix F includes all technical requirements for user management.

## 2. a. ii. Features and functional requirements

1. **Configuration.** Users will be able to customize their experience to streamline common searches and map filters. Upon initial log-in, they will be presented with options to select their state, territory, or tribal area. This selection will be retained for future user sessions.
2. **Maps.** Users will be able to create customized maps of community service providers based on several filters and data layers. They will be able to save maps at any point during the process and return to them for future use. (Saved maps will be available via a menu item labeled “My Maps/Reports.”)
  - a. Users will be able to create a map using three broad filter types: location, service, and data layer.
    - i. *Location Filter:* Users will be able to select a state/territory/tribal area or LIA.
    - ii. *Service Filter:* A menu of service types will be presented for the given location. One or more service types (e.g., mental health, substance abuse) can be selected by the user, with representations of the filtered providers appearing on the map dynamically.
    - iii. *Data Layer Filter:* Users will be able to show the Neighborhood Disadvantage Index (i.e., index that includes poverty, education, housing, and employment at the highly granular level of the census block groups, which are like neighborhoods) as a data layer for any location they select. In addition, accessibility data layers will also be available to provide a visual representation of driving distances from providers shown on the map. Only one data layer can be displayed at a time.
  - b. Additional functionality in the maps view:
    - i. MIECHV risk indicators (e.g., socioeconomic status, child maltreatment rates) for the county will be displayed next to the map.
    - ii. Users will have the capability to click on individual service providers to open a window with more details about the provider (e.g., location, hours, general information).
    - iii. After various filters have been added to the map, users will be able to download a list (in PDF or CSV format) of all service providers matching their criteria. The filtered searches can also be saved to a user’s account for future reference.
3. **Reports.** Users will be able to create customized reports. Like maps, users will be able to save reports for future use (available via a menu item labeled “My Maps/Reports”).
  - a. To create a report, a user will start by choosing an analysis and a format.
    - i. Analysis Options

1. *Area Overview* provides information about the number of service providers, the families served, and risk indicators for a given area (national, state/territory/tribal area, or LIA).
  2. *Supply and Demand* compares statistics on providers and referrals to reveal gaps between available providers and the needs of the clients in the LIA and/or the needs of residents in the county.
  3. *Service Accessibility* provides information about the accessibility of providers in a given area (national, state/territory/tribal area, or LIA) such as the percent of neighborhoods in an area that have a provider within a reasonable driving distance.
- ii. Format Options
1. *Current Snapshot* shows the latest data for a single location.
  2. *Geographic Comparison* allows the user to compare two or more locations.
  3. *Longitudinal Comparison* allows the user to compare data from two or more years for one location.
- b. The user will then select a location for the report (a state/territory/tribal area or LIA).
  - c. Once the report is generated, the user can add a title and save the report to "My Maps/Reports." Additionally, the user can download a PDF of the report or a CSV file of the data contained in the report.
  - d. At the top of the report, each selection the user made to create the report remains editable so that the user can refine the report.
  - e. For longitudinal comparison reports, users will select two or more years to compare.
  - f. For service accessibility reports, users will select one or more service types (e.g., mental health, substance abuse).

## 2. b. Obtaining and preparing data

### 2. b. i. Obtaining initial data

The data sources for the tool fall into two broad categories: (1) publicly available data, and (2) home visiting administrative data. See Appendix D for recommended data sources.

#### 2. b. i. a. Publicly available data

A majority of the publicly available datasets can be obtained by accessing a website and simply downloading the dataset, or by requesting the dataset from the data holder (typically HRSA).

2-1-1 data cannot be accessed in such a straightforward manner. The project team recommends using data scraping techniques to obtain 2-1-1 data regarding service providers' names, descriptions, addresses, phone numbers, and hours of operation. The developer will need to locate every 2-1-1 website in the United States. This may be at the county, region, or state level. Then the developer will need to examine the structure of each 2-1-1 website to determine the appropriate fields to scrape. Finally, the developer will need to write programming code to scrape data from the website. Some 2-1-1

websites are from the same web developer, so the code needed to scrape data from those websites are in the same format. Therefore, the developer can adapt scraping code of one 2-1-1 website for other similar ones. See Appendix H for sample scraping codes.

To obtain latitude and longitude of service provider locations (which are needed to create drive-time perimeters around community service providers, as well as calculate the distance between the provider and a public transit station), Google Maps data will be used. The tool developer will use Google Places “Application Programming Interface” (API), a tool Google uses to assist customers who develop software and applications. Because the API has usage limits with pricing options, developers will first have to obtain a Google Places API key to ensure they have access to a free daily quota. There is also an option to increase the daily quota by enabling pay-as-you-go billing. The developer will use physical addresses of the community service providers to request latitude and longitude.

Google Maps data may have budget implications if the number of queries exceeds Google API’s free daily quota. However, the project team does not think this issue will arise unless the project is on a tight timeline and requires downloading Google data within a short period (e.g., within a week). The team strongly recommends that the tool developer closely monitors Google API’s most updated usage and billing policy to plan and budget accordingly. The tool developer should also obtain permission from Google to use Google Maps data.

#### [2. b. i. b. Home visiting administrative data](#)

Home visiting administrative data will be provided by each state’s MIECHV awardee. The tool developer will need to work closely with HRSA to develop a strategy for obtaining these data sources. This strategy will likely involve obtaining Office of Management and Budget (OMB) clearance that will allow the tool developer to collect necessary data from each state’s MIECHV awardee.

The following LIA-level data will need to be obtained from MIECHV state awardees:

- Zip codes served by each LIA (collected for HRSA Form 4)
- Client demographics (collected for HRSA Form 1)
- Number of client referrals in each category (tobacco referrals, child development referrals, intimate partner violence referrals, and depression referrals; collected for HRSA Form 2)
- Results from client screeners in each category (positive screens for tobacco use, developmental delays, and intimate partner violence; collected for HRSA Form 2)

#### [2. b. ii. Initial data cleaning](#)

Some data sources will require minimal cleaning to ensure that the variables and values are structured in a way that the tool developer can use the data. This will be the case for administrative data obtained from each state awardee, given that the data may be in different formats. Other data sources require more complicated cleaning. The developer should propose a plan for efficient data cleaning of the different types of data in this tool.

Because data from each 2-1-1 website have different structures, the developer will need to clean scraped data. For example, the developer will need to reshape and structure the data to reflect that a service provider could have multiple sites and/or multiple types of addresses (mailing address and physical address). The developer must also ensure a consistent format of data such as service providers' hours of operation.

#### 2. b. iii. Variable creation

For some data sources, the tool developer will need to create variables. Examples of variables that will be needed are provided below:

- A shapefile with the information the web-based tool will use to draw a drive-time perimeter around every community service provider. This will be created using providers' physical addresses and Google Maps data.
- A code indicating whether a community service provider is within a 10-minute walk from a public transit stop, based on providers' physical addresses and Google Maps data.
- A code indicating whether a neighborhood is disadvantaged or non-disadvantaged, based on the Area Deprivation Index.<sup>27</sup>
- A code indicating whether a county is urban, suburban, or rural, based on the location of each metropolitan statistical area's principal city. This is one of the most complex variable creation activities because the tool developer will need to place the principal cities of metropolitan statistical areas on a map that has county boundaries, and then code counties as rural, urban, or suburban based on the presence of a principal city and/or a metropolitan statistical area.
- The number of HRSA risk indicators in each county that are worse than the state's mean for the risk indicator.

#### 2. b. iv. Initial data storage

Data scraped from 2-1-1 websites will require significant storage and computing capacity given its size. According to an estimation based upon data of three counties in California (Riverside, Los Angeles, and San Bernardino), the project team estimates that the size of the 2-1-1 dataset of the United States will be around 20 GB. Therefore, the team recommends utilizing distributed solutions (e.g., to store data over a network of interconnected computers using programs such as MongoDB with Hadoop) for data cleaning, storage, and computation processes. Storage of other data sources (i.e., other publicly available datasets, home visiting administrative data) will fit within this proposed data storage plan.

#### 2. c. Cost considerations for initial development/build

All software recommended in this document, except for Google Maps, is open-source and therefore available at no cost. Google Maps currently assesses a monthly fee based on the number of searches conducted. However, Google is also expanding its free Google Maps platform for nonprofits, so the

---

<sup>27</sup> The Area Deprivation Index (ADI) ranks U.S. Census block groups from 1 to 100, where 100 represents the greatest disadvantage. The ADI is calculated using 17 poverty, education, housing, and employment indicators. (University of Wisconsin School of Medicine and Public Health, 2018).

project team advises rechecking costs and determining if there is a free version available when the tool build is authorized.

Hosting fees will vary widely based on the developer's choice of platform and recommended or preferred hosting provider.

#### *2. d. Timeline considerations*

The project team suggests an incremental, Agile-based approach with defined feedback loops. Agile is a method for managing software development projects that helps teams respond to the unpredictability of constructing software. It uses incremental, iterative work sequences that are commonly known as sprints. Each sprint represents a small portion of the application build. Results from sprints are shared frequently with stakeholders, allowing for feedback and the avoidance of missteps.

A brief discovery period will be required before the selected development team begins the first Agile sprint. During this period, the development team should identify key issues regarding the tool's overall design and work directly with the client team to address them, preferably in a series of on-site meetings.

Basic design iterations should be delivered early in the process for client review. In a project of this length, it is suggested that meetings (telephone conferences) be held at the end of each sprint (which is typically two weeks long). Both the development team and the client team should participate in these meetings and focus on reviewing functional areas and discussing outstanding issues. These should be considered "working" meetings, in which specific implementation details are discussed.

More broadly, overall project check-in calls should be scheduled at the outset of the project to measure progress against initial development benchmarks. These calls should involve key stakeholders on the client team—not just project managers—and the daily development team.

### *3. Ongoing operations and maintenance*

#### *3. a. Code revision schedule*

Custom code written by the tool's development team will need to be revised on a schedule. A reasonable benchmark would be that 20 percent to 30 percent of the codebase will likely need to be reviewed (and possibly updated) every 12 to 18 months to keep up with industry/security practices and front-end trends. Some of these updates may stem from changes in the underlying software and data sources, as described in Appendix F. However, it is more likely that trends in best practices will drive these updates to keep the tool effective and useful for its end users.

Total lines of custom code could be calculated after the release of an MVP. From this baseline, a percentage change could be calculated and budgeted for at least twice a year. It should also be assumed that functional requirements will be added as the tool evolves, although those changes would be budgeted separately as requirements are defined.

### 3. b. How frequently to update data

Some of the data sources that feed the tool will need to be periodically updated. The update frequency for each data source is presented in Tables G1 and G2.

**Table G1. Data Source Update Frequency for Publicly Available Data**

<b>Data Source</b>	<b>Update Frequency</b>
<b>Substance Abuse and Mental Health Services Administration's (SAMHSA) facility locator map</b> ( <a href="https://findtreatment.samhsa.gov/locator">https://findtreatment.samhsa.gov/locator</a> ) for information on community service providers.	Data should be stored locally and updated at least annually. Monitoring of the dataset periodically at shorter intervals (monthly) would improve the completeness of the data (new providers may be added at any time by SAMHSA).
<b>State or county 2-1-1 websites</b> for information on service providers.	The project team suggests the tool developer pull 2-1-1 data annually. The developer will need to update codes to reflect changes in the website structure. Specifically, the developer will monitor (1) any changes in terms of service, and (2) any changes in website and data structure.  The tool developer may also consider using other online data sources, such as Aunt Bertha or Google. These data sources are updated more frequently than 2-1-1 websites, so the team suggests pulling data quarterly.
<b>Area Deprivation Index (ADI)</b> at the U.S. Census Bureau block-group level to describe the accessibility of services to at-risk populations.	This data is not updated regularly but should be monitored for large changes. (The developer can also contact the ADI source directly for information on expected updates.)
<b>Urbanicity of LIA areas</b> to describe counties' urbanicity.	These files should be updated (or checked for currency) on an annual basis.
<b>Cartographic Boundary KML (Keyhole Markup Language) files from the U.S. Census Bureau</b> will be used to display information about the geographic area (census block groups, census tracts, states, tribal areas, U.S. territories, and zip codes), such as the block group's level of relative disadvantage.	These files should be updated (or checked for currency) on an annual basis. When census tracts and block groups change (after each decennial census), this fact should be noted in the results from longitudinal analyses.

Data Source	Update Frequency
<b>Google Maps</b> will be used to determine the latitude and longitude of community service providers.	Latitude and longitude should be requested every time a new list of community service providers is added to the tool (likely annually). The developer will need to update codes to reflect any changes in the website structure. Specifically, the developer will monitor any changes in (1) terms of service, (2) website and data structure, and (3) pricing policy.

**Table G2. Data Source Update Frequency for Home Visiting Administrative Data**

Data Source	Update Frequency
<b>Names and locations of all LIAs</b> to populate the LIA lists in the web-based tool.	This information should be updated annually. The tool may also allow users to request the addition or removal of LIAs in the interim.
<b>Zip codes of clients served in the LIA</b> to determine the geographic area service by the LIA.	This information should be updated annually.*
<b>Client demographics</b> to describe clients' race/ethnicity, primary language, and the number of adults and children served by the LIA.	This information should be updated annually.*
<b>Number of client referrals by category.</b>	This information should be updated annually.*
<b>Results from client screeners.</b>	This information should be updated annually.*

*\*Although data will likely change throughout the year, requesting data more than annually would be a burden on states.*

### 3. c. Tool lifespan

Significant overhauls to the tool should be expected over time. Given the continual evolution of front-end design and mobile capabilities, this tool should have an expected “peak” lifespan of three to five years. Beyond that, it is likely that major changes to the design and codebase will need to be incorporated for the tool to remain useful and relevant with the current technical landscape.

The tool should be re-evaluated two to three years after the delivery of the MVP to determine if it remains:

- Technically secure
- Functionally operable across the latest devices
- Accurate and complete in terms of the data it is displaying (an ongoing task, as defined above)

### *3. d. Annual ongoing operations cost considerations*

It will be necessary to plan for time to maintain the application framework and third-party code (incremental upgrades, API changes, etc.) and add functional changes to the custom code base. Each year, the tool developer should plan for the time needed to monitor, modify, re-scrape, process, and store data from each 2-1-1 website. Hosting costs once the project is live must also be considered.

### *4. Challenges and constraints in the implementation of the tool*

- **Multiple data sources.** Given the varying data sources comprising the core tool functionality, outdated, inconsistent, or poorly formatted data is a major risk to the overall effectiveness of the tool. The 2-1-1 websites update their data and change their structures; thus, once there are changes in online data (e.g., a new record appears on a 2-1-1 website), the changes should be captured in a new round of data scraping and reflected in the updated web tool. As indicated above, the tool developer will need to update data scraping and cleaning codes regularly to reflect changes in website structures.
- **Cross-site scripting and similar attack vectors.** Because the tool will rely heavily on JavaScript, it will be susceptible to cross-site scripting (XSS) attacks and similar malicious actions. These attacks are relatively easy to defend against proactively, so time should be taken at the outset to identify any possible attack vectors and develop mitigation strategies.
- **508 compliance.** All data views must be compliant with Section 508 governmental standards. The initial suite of tools (e.g., Google Maps) was selected and vetted with 508 compliance in mind. However, steps should be taken to conduct periodic 508 reviews as new functionality is added over time.
- **Cross-platform compatibility.** The tool will need to operate seamlessly on mobile devices. Tools should be selected based on mobile compatibility and ease of integration. Compatibility should be tested throughout the development process of the MVP. Waiting until the end of the timeline to ensure compatibility could result in major cost overruns.

## Appendix H: Data Scraping/Python Codes

We provide code below only to exemplify the scraping process. Please refer to the /robots.txt file (i.e., the Robots Exclusion Protocol) of each 2-1-1 website before scraping any data. If the data you are about to scrape is included in URL(s) with prefix(es) in the “Disallow” category for any user-agent (i.e., User-agent: \*), please contact the corresponding 2-1-1 agency before any scraping activities.

### Shared Function to Check if Pages are Scrapable

```
import urllib.robotparser
```

```
def check_robots(robot_file, url_to_scrape):
```

```
    """
```

```
    Checks if the a url path is scrapable according to the robots.txt file.
```

```
    Parameters:
```

```
    robot_file (str): Path to the robots.txt file for the top-level domain
```

```
    url_to_scrape (str): The path the url we plan to scrape.
```

```
    Returns:
```

```
    None: Raises exception if the page is not scrapable
```

```
    """
```

```
    rp = urllib.robotparser.RobotFileParser()
```

```
    rp.set_url(robot_file)
```

```
    rp.read()
```

```
    #use robot parser to check if the url_to_scrape is included in links that are disallowed
```

```
    searchable = rp.can_fetch("*", url_to_scrape)
```

```
    if searchable:
```

```
        pass
```

```
    else:
```

```
        raise Exception('We are not allowed to scrape this page! For more information,see  
{0}'.format(robot_file))
```

### Scraping Riverside 2-1-1 Data

```
# coding: utf-8
```

```
import pandas as pd
```

```
import re
```

```
import urllib.robotparser
```

```
# Check if it is OK to scrape the page
```

```
#this must point directly to the robots.txt file for the domain we are searching
```

```
robot_file = "http://connectriverside.org/robots.txt"
```

```
#this must point to the page we are scraping
```

```
url_to_scrape = "http://connectriverside.org/search-211-database/"
```

```
#this check must be run for every page we scrape
```

```

check_robots(robot_file, url_to_scrape )

def scrapeThePage(links):
    for i in range(0, 15):
        id = 'rptSearchResults_A2_' + str(i)
        try:
            element = driver.find_element_by_xpath('//*[@id="' + id + '"']')
            link = element.get_attribute('onclick').replace('window.open(',
''.replace('');return false;','')
            links = links + [link]
        except:
            break
    return links
# :

# # Start Driver
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
driver = webdriver.Firefox()

url = 'http://connectriverside.org/search-211-database/'
driver.get(url)
driver.implicitly_wait(10)

# # find the iCarol.info link
content = driver.page_source
f = open('source.txt', 'w')
f.write(content)
f.close()

url =
'http://www.icarol.info/Search.aspx?org=2327&Count=5&Search=&NameOnly=False&pst=Physical&sort=Alphabetical&TaxExact=False&Country=United%20States&StateProvince=CA&City=-1'
driver.get(url)
textfield = driver.find_element_by_id('txtSearch')
textfield.click()
textfield.clear()
textfield.send_keys('Program')
textfield.send_keys(Keys.ENTER)

# # find the program link
links = []
links = scrapeThePage(links)
for p in range(2, 116):
    url = 'http://www.icarol.info/Search.aspx?org=2327&Page=' + str(p) +
    '&Count=15&Search=Program&NameOnly=False&pst=Coverage&sort=Alphabetical&TaxExact=False&Country=-1'
    driver.get(url)
    driver.implicitly_wait(10)
    links = scrapeThePage(links)

```

```

# save links
links_df = pd.DataFrame({'link': links})
links_df.to_csv('riverside_links.csv')

# # scrape program information
links = list(pd.read_csv('riverside_links.csv')['link'])
print(len(links))

for i in range(0, len(links)):
    link = links[i]
    driver.get(link)
    driver.implicitly_wait(10)
    try:
        driver.switch_to_alert().accept()
    except:
        pass
    try:
        program_name =
driver.find_element_by_id('lblTitle').get_attribute('innerHTML').replace('Program:
','')
    except:
        program_name = ''

    # program link
    try:
        program_url =
driver.find_element_by_id('hlAgencyWebsite').get_attribute('href')
    except:
        program_url = ''

    # program description
    try:
        program_description =
driver.find_element_by_id('lblAgencyDescription').get_attribute('innerHTML').replace(
'<b>Description</b><br>', '').replace('<br>', '')
        program_description = re.sub('<.*?>', '', program_description)
        program_description = program_description.replace('&nbsp;', ' ')
    except:
        program_description = ''

    # program address
    try:
        program_address =
driver.find_element_by_id('lblAgencyPhysicalAddress').get_attribute('innerHTML').repl
ace('<br>', ' ')
    except:
        program_address = ''

    # program hours
    try:
        temp = driver.find_element_by_id('tblOrgHours').get_attribute('innerHTML')
    except:

```

```

        temp = ''
    if len(temp.replace('\n', '')) == 0:
        try:
            temp =
driver.find_element_by_id('lblAgencyHours').get_attribute('innerHTML')
        except:
            temp = ''
        temp = re.sub(r'\n\t<tbody><tr>\n\t\t<td colspan="[0-9]">', '', temp)
        temp = temp.replace('<b>Program Hours:</b><br>', '')
        temp = temp.replace('<b>Program Hours:</b>', '')
        temp = temp.replace('<b>Agency Hours:</b><br>', '')
        temp = temp.replace('<b>Agency Hours:</b>', '')
        temp = temp.replace('<b>ProgramAtSite Hours:</b><br>', '')
        temp = temp.replace('<b>ProgramAtSite Hours:</b>', '')
        temp = temp.replace('</td>\n\t</tr><tr>\n\t\t<td valign="top"
align="left"><span><br>Open:<br>Closed:<br></span></td><td valign="top"
align="center"><span><b>', '')
        temp =
temp.replace('</span></td>\n\t</tr><tr>\n\t\t<td><span><br><br></span></td>\n\t</tr>\n
n</tbody>', '')
        temp = temp.replace('</b><br>', ': ')
        temp = temp.replace('<br>', ' - ')
        program_hours = temp.replace('</span></td><td valign="top"
align="center"><span><b>', '; ')

    # eligibility
    try:
        eligibility =
driver.find_element_by_id('lblEligibility').get_attribute('innerHTML')
        eligibility = re.sub('<.*?>', '', eligibility)
    except:
        eligibility = ''

    # service area
    try:
        service_area_elements =
driver.find_element_by_id('tblResourceCoverageArea1').find_elements_by_xpath('./tbody
/tr/td')
        service_area = ' '.join([e.get_attribute('innerHTML') for e in
service_area_elements])
        service_area = re.sub('<.*?>', '', service_area)
    except:
        service_area = ''
    if service_area == 'Defined coverage area:':
        service_area = ''

    # categories
    try:
        category_elements =
driver.find_element_by_id('tblCategories').find_elements_by_xpath('./tbody/tr[2]/td/a
')
        exclude_elements =
driver.find_element_by_id('tblCategories').find_elements_by_xpath('./tbody/tr[2]/td/a
[@href = "#tvCategories_SkipLink"]')

```

```

        categories = '; '.join([e.get_attribute('innerHTML') for e in
category_elements if not e in exclude_elements])
        categories = categories[:-2]
    except:
        categories = ''

    d = {'211url': link, 'program_name': program_name, 'program_url': program_url,
        'program_description': program_description, 'program_address':
program_address,
        'program_hours': program_hours, 'eligibility': eligibility,
        'service_area': service_area, 'categories': categories}
    newdata = pd.DataFrame(d, index = [i])
    if i == 428:
        data = newdata
    else:
        data = pd.concat([data, newdata])

data.to_csv('riverside_programs.csv')

# # quit driver
driver.close()

```

## Scraping Los Angeles 2-1-1 Data

```

# coding: utf-8
import string
import time
import re
import pandas as pd
import urllib.robotparser

#Check if we are allowed to scrape the page
robot_file = "https://www.211la.org/robots.txt"
url_to_search = "https://www.211la.org/search/"
check_robots(robot_file, url_to_scrape )

def scrapeThePage(links):
    elements = driver.find_elements_by_xpath('//*[@class="site-details search-result-
item search-result-description"]')
    links = [e.find_element_by_xpath('.//a').get_attribute('href') for e in elements]
    return links
# :

# # Start Driver
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
driver = webdriver.Firefox()

# # find the program link
for keyword in ['program', 'agency']:
    print(keyword)

keyword = 'agency'

```

```

url = 'https://www.211la.org/211search?keyword=' + keyword + '&location='
driver.get(url)
driver.implicitly_wait(10)
links = []
links = links + scrapeThePage(links)
for p in range(2, 528):
    time.sleep(6)
    xpath = './li/span[text()[contains(., "' + str(p) + '")]]'
    element = driver.find_element_by_xpath('//ul[@class="simple-paginator text-right"]')
    element.click()
    links = links + scrapeThePage(links)

# save links
links_df = pd.DataFrame({'link': links})
links_df.to_csv('LosAngeles_links.csv')

# # scrape program information
links = list(pd.read_csv('LosAngeles_links.csv')['link'])
for i in range(0, len(links)):
    link = links[i]
    driver.get(link)
    driver.implicitly_wait(10)
    program_name =
driver.find_element_by_class_name('d_top').get_attribute('innerHTML')
    try:
        program_description = driver.find_element_by_class_name('search-result-content-overview').get_attribute('innerHTML')
    except:
        program_description = ''

    # program address
    try:
        e1 = driver.find_element_by_class_name('global-info')
        e2 = e1.find_elements_by_xpath('./div[2]/div/div')
        for e in e2:
            try:
                temp = e.find_element_by_xpath('./p').get_attribute('innerHTML')
                if temp.endswith('(Physical)'):
                    program_address = temp.replace('(Physical)', '')
            except:
                continue
    except:
        program_address = ''

    # program url
    try:
        e = driver.find_element_by_class_name('search-result-content-url')
        program_url = e.find_element_by_xpath('./a').get_attribute('href')
    except:
        program_url = ''

    # program hours
    try:

```

```

        program_hours = driver.find_element_by_class_name('search-result-content-
hours').get_attribute('innerHTML')
    except:
        program_hours = ''

    # program services
    try:
        e0 = driver.find_elements_by_class_name('panel-title')
        e1 = [e for e in e0 if 'fa fa-tag' in e.get_attribute('innerHTML')]
        services = []
        for e1_element in e1:
            service = ' '.join([re.sub('<.*?>', '', e.get_attribute('innerHTML')) for
e in e1_element.find_elements_by_xpath('./a/span')])
            services = services + [service]
        program_services = '; '.join(services)
    except:
        program_services = ''

    d = {'211url': link, 'program_name': program_name, 'program_description':
program_description,
        'program_address': program_address, 'program_url': program_url,
'program_hours': program_hours,
        'program_services': program_services}
    newdata = pd.DataFrame(d, index = [i])
    if i == 0:
        data = newdata
    else:
        data = pd.concat([data, newdata])

data.to_csv('LosAngeles_programs.csv')

# # quit driver
driver.close()

```

## Scraping San Bernardino 2-1-1 Data

```

# coding: utf-8
import string
import time
import re
from math import floor
import pandas as pd
import urllib.robotparser

#Check if we are allowed to scrape the page
robot_file = "https://www.211sb.org/robots.txt"
url_to_search = "https://www.211sb.org/search/"
check_robots(robot_file, url_to_scrape)

def scrapeThePage(links):

```

```

        elements = driver.find_elements_by_xpath('//*[@class="btn btn-primary more
morene"']')
        links = [e.get_attribute('href') for e in elements]
        return links
# :

# # Start Driver
from selenium import webdriver
from selenium.webdriver.common.keys import Keys
driver = webdriver.Firefox()

# # find the program link
length = 3381
links = []
for p in range(0, length, 5):
    url = 'https://211sb.org/search/?text=program&location=&search='+ str(p)
    driver.get(url)
    driver.implicitly_wait(10)
    links = links + scrapeThePage(links)
    if p % 1000 == 0:
        links_df = pd.DataFrame({'link': links})
        links_df.to_csv('SanBernardino_links.csv')

# save links
links_df = pd.DataFrame({'link': links})
links_df.to_csv('SanBernardino_links_final.csv')

# scrape again for those without full links
links_df['flag'] = links_df.link.map(lambda x: x[-1] == '=')
new_set = set(list(map(lambda x: floor(x / 5) * 5,
list(links_df[links_df.flag].index))))
print(len(new_set))
links = []
for p in new_set:
    url = 'https://211sb.org/search/?text=program&location=&search='+ str(p)
    driver.get(url)
    driver.implicitly_wait(20)
    links = links + scrapeThePage(links)
# save new links
links_df = pd.DataFrame({'link': links})
links_df.to_csv('SanBernardino_links_add.csv')

# combine links
links = list(pd.read_csv('SanBernardino_links.csv')['link'])
links2 = list(pd.read_csv('SanBernardino_links_add.csv')['link'])
print(len(links), len(links2))
links = links + links2
print(len(links))
links_df = pd.DataFrame({'link': links})
links_df['flag'] = links_df.link.map(lambda x: x[-1] == '=')
print(len(links_df))
links_df = links_df[links_df.flag == False]
print(len(links_df))

```

```

links_df = links_df.drop_duplicates()
print(len(links_df))
links_df.to_csv('SanBernardino_links_final.csv')

# # scrape program information
links = list(pd.read_csv('SanBernardino_links_final.csv')['link'])
len(links)
for i in range(0, len(links)):
    link = links[i]
    driver.get(link)
    driver.implicitly_wait(10)
    #program name
    try:
        program_name = driver.find_element_by_xpath('//*[@class="name resource-
name"]').get_attribute('innerHTML')
    except:
        program_name = ''

    #agency name
    try:
        program_agency = driver.find_element_by_xpath('//*[@class="name resource-name
agency-info label"]').get_attribute('innerHTML')
    except:
        program_agency = ''

    #program description
    try:
        program_description = driver.find_element_by_xpath('//*[@class="description
resource-description"]').get_attribute('innerHTML')
    except:
        program_description = ''

    # program address
    try:
        program_address = driver.find_element_by_xpath('//*[@class="address resource-
address"]').get_attribute('innerHTML').replace('<br>', '')
    except:
        program_address = ''

    # program eligibility
    try:
        program_elig =
driver.find_element_by_xpath('//*[@class="hours1"]').get_attribute('innerHTML')
    except:
        program_elig = ''

    # program url
    try:
        program_url = driver.find_element_by_xpath('//*[@class="information-item
small-label website"]').get_attribute('href')
    except:
        program_url = ''

    # program hours

```

```

    try:
        program_hours_elements = driver.find_elements_by_xpath('//*[@class="hours"]')
        program_hours_texts = list(map(lambda x: x.get_attribute('innerHTML'),
program_hours_elements))
        program_hours = '; '.join(program_hours_texts)
    except:
        program_hours = ''

    d = {'211url': link, 'program_name': program_name, 'program_agency':
program_agency, 'program_description': program_description,
        'program_address': program_address, 'program_url': program_url,
'program_hours': program_hours,
        'program_elig': program_elig}
    newdata = pd.DataFrame(d, index = [i])
    if i == 2622:
        data = newdata
    else:
        data = pd.concat([data, newdata])
print(i)
data.to_csv('SanBernardino_programs.csv')

# # quit driver
driver.close()

```