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homebridger
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Optimizing Collective Impact

A Quantitative Analysis of Service Pathways in the HomeBridger Ecosystem

Anna Choi, Mary Guan, Wendy Guerrero, Nate Hu, Nick Richards, Katie Shao, Laura Wang

Emory University

Department of Quantitative Theory and Methods

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Advisor: Dr. Jiwon Kim

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1. Summary

Our Emory University capstone project with TechBridge analyzed collaborative service data from the HomeBridger platform to optimize nonprofit effectiveness. Key findings include: (1) significant variations in service success rates across domains (55.5%-100%), with Adult Education and Financial services requiring focused improvement; (2) housing stability improvements averaging +2.13 points for 55.5% of clients, with clear organizational performance differences; (3) demographic disparities showing lower success rates (75.9%) among Black/African American clients despite their majority representation; (4) timing analysis revealing that goals addressed within 30 days have highest success rates (85.5%), with a critical failure window at 90-180 days; (5) financial forecasting projecting monthly assistance needs of $70,000-$100,000; and (6) family clustering identifying four distinct need profiles requiring tailored service approaches. Our recommendations provide TechBridge and partner NGOs with actionable strategies to enhance data quality, optimize service sequencing, address equity gaps, and implement predictive analytics. These evidence-based insights will strengthen the collaborative network's ability to deliver impactful, coordinated care that produces sustainable improvements in client outcomes.

2. Introduction and Background

This white paper details the findings of an Emory University capstone project conducted in partnership with TechBridge, focusing on the analysis of the HomeBridger dataset to enhance nonprofit effectiveness through data-driven insights. Our research aimed to understand client characteristics, evaluate service efficacy, identify patterns correlating with successful outcomes, and explore optimal service pathways by analyzing client housing trajectories, service sequences, and income support structures within the collaborative network. While critical data inconsistencies regarding record origins, identifiers, and timestamps presented analytical challenges, this study utilized quantitative methods and prototype development to extract actionable intelligence from the available data. The following sections outline the methodologies employed, present key findings on client progress and service impact, discuss the implications of data quality issues, and offer recommendations for leveraging these insights and improving future data collection within the TechBridge ecosystem to maximize the benefits of collective action.

3. Problem Statement

Despite significant investments in social services across housing, employment, and basic needs sectors, many communities continue to face persistent challenges in coordinating care and measuring collective impact. Prior to HomeBridger's implementation, participating NGOs operated largely in isolation, with limited visibility into clients' comprehensive service journeys or needs addressed by partner organizations. Our research addresses the core question: ***How would TechBridge's HomeBridger data sharing platform help participating NGOs improve their service delivery effectiveness?*** Through our analysis of HomeBridger data, we conducted preliminary data analysis, living situation transformation analysis, service path analysis, and funding analysis. The whole objective aims to provide evidence-based insights for improvement opportunities in services for NGOs and guide future platform enhancements.

4. Comprehensive Data Analysis

4.1. Dashboard

To support data-driven decision-making within TechBridge, we developed an interactive dashboard that provides Exploratory Data Analysis (EDA) across key dimensions of client progress. The dashboard integrates and visualizes insights drawn from two primary sources: the PMDM_Program_Engagement sheet and the CLIENT_GOAL sheet. After merging these sources into a unified dataset, we focused on records from Non-Governmental Organizations (NGOs) with more than 100 goal-related entries to ensure statistical reliability. Importantly, all entries in the dashboard are analyzed at the **Family Collaborative** level. This means that each record reflects either an individual client or a family unit, depending on whether the client is associated with registered family members. Grouping clients in this way allows for a more holistic understanding of household-level service outcomes and needs. Refer to **Appendix A** for the dashboard overview.

To maintain analytical clarity, we limited the scope of the analysis to goal records marked as either **"Achieved"** or **"Not Achieved**, " excluding incomplete or ambiguous entries. This binary outcome framework allowed for consistent comparison across organizations and service types.

One core feature of the dashboard is the calculation of service duration, measured as the number of days between a client's goal-setting date and their target completion date. To ensure

data quality, negative durations were reset to zero, and missing date values were imputed appropriately.

The dashboard is segmented into modules that separately analyze success patterns, failure modes, housing stability, demographic factors, and overall exploration, each offering a unique aspect for NGOs to track their service delivery and proceed with proper improvements.

4.1.1 Success Analysis

This analysis evaluates the key factors contributing to the success of each project, including success rate by categories, housing stability success factors, and living situation mapping. With these indicators, we are able to see a comprehensive understanding of what factors influence the success of a project more.

Based on our analysis, different domains have different success rates, with “SH Young Goal” having the highest of 100% success rate and “Adult Education” having the lowest of 55.5% success rate. In between, we have “Ex Coach: Pillar II. Economic Status & Support”s at 97.3%, “Housing” at 85.1%, “Employment” at 84.0%, “Ex Coach: Pillar I. Adult & Children Education” at 83.3%, “Basic Needs & Identification” at 81.4%, “Childcare & Education” at 78.1%, “Housing Support: Core Goals” at 77.5%, “Adult Health” at 75.9%.”, Social Capital (Connection to peers/community)” at 73.2%, “Financial” at 69.7%, and “Unknown” at 68.6%. With these statistics, we are able to see that more improvement is needed for projects related to “Adult Education” and “Financial”. This is definitely a good indication that reveals the area that organizations are more familiar with, leading to a high success rate, and ones that are harder to resolve, resulting in a low success rate.

Further down, we found some key success factors focusing on house stability. The most successful housing designations are “Rental by client, no ongoing housing subsidy” with 45.2% of improved housing, followed by “Rental by client, with other ongoing housing subsidies (including RRH) with 25.1% of improved housing. The other top five situations are “Rental by client, with other ongoing housing subsidy with 9.7% of improved housing, “Emergency shelter, including hotel or motel paid for with emergency shelter voucher” with 5.4% of improved housing), and “Staying or living in a family member's room, apartment or house” with 3.1% of improved housing. We can see that the housing situation that improves more is the one that is originally at a higher standpoint. This indicates that improvement in housing support is needed to

help households with more emergent housing status, as they are the ones who require more assistance from the organizations.

Lastly, we have success rates based on the living situation at entry. This is an interesting path that we dive into to see how the initial status of a household affects the success rate of their request. The highest percentage of 100% goes to two types of living situations, “Rental by client, with RRH or equivalent subsidy” and “Staying or living in a friend’s room, apartment, or house”. The lowest success rate of 82.9% contributes to “Missing”, and the second lowest of 87.1% goes to “Emergency shelter, including hotel or motel paid for with emergency shelter voucher”. Through these statistics, we don’t see a clear trend based on the emergence of the living situation with the success rate of the project. For example, the worst initial situation of “Place not meant for habitation” has a high success rate of 95.3%. At the same time, situations that seem better, such as “Staying or living in a family member's room, apartment, or house,” have a success rate of only 88.7%, and “Rental by client with other ongoing housing subsidy” has only 90.2%. From this, we see that it isn’t necessary that the living situation is more severe. More measurements should be done to fill in the “Missing” data for us to find an actual relationship, as there are more than 1000 situations with “Missing” while other status only has a number of entries ranging from 11 to 62.

4.1.2. Failure Analysis

Following the success factors, failure factors are another important indicator that we analyze to help organizations identify some key reasons for failure. Out of the five organizations, the average failure rate is 22.6%, with a total of 1999 failure cases. At the same time, we have an average time before failure of 61.3 days, and a more specific time analysis will be elaborated later on. Similarly, failure analysis is divided into three parts: top failure factors, living situations at entry with the highest failure rates, and primary reasons for goal failure.

The top failure domain is “Mental Health Care” with a 100% rate, but this is irrelevant as there's only one case in this domain. Thus, the actual highest failure domain is “Adult Education: with 44.5%, followed by “Education/Childcare” with 44.4%. These correspond back to the success analysis of the success factor, where we see “Adult Education” also has the lowest success rate. The domains with the lowest failure rate are “Basic Needs & Identification” at 18.6%, followed by “Childcare & Education” at 21.9%. Other domains with high failure rate to

low failure rate are in the sequence of “Financial”, “Social Capital (Connection to peers/community)”, “Adult Health”, and “Housing Support: Core Goals”. We can see that most of these sequences correspond back to the success factors, suggesting that organizations do need to focus on projects that are within domains such as adult education to improve their success rate and lower their failure rate.

Then we move on to failure rates and living situations at entry. The living situation at entry with the highest failure rate is “Rental by client, no ongoing housing subsidy” at 17.4%, followed by “Missing” at 17.1%. The situations with the lowest failure rates are “Rental by client, with RRH or equivalent subsidies” at 0% and “Hotel or motel paid for without emergency shelter voucher” at 2%. Again, better statistical models can only be developed if “Missing: can be filled with actual data. With more than 1000 missing values compared to other categories with 11 to 121 values, a clear relationship between living situation and entry and failure rate is difficult to map out.

Finally, moving to the primary reason for goal failures, the top situation of “Completed program” can be ignored, as those are the ones that have already succeeded. Then it is followed by “Missing” with 28.5%, and after that is “Unable to contact” with 13.1%. Some other reasons include “Non-compliance with program” at 5.3%, “Not eligible for service” at 3.45%, and “FEP: Drop-outs for program” at 3.15%. These are all some major reasons for goal failure that organizations can pay more attention to in the future.

4.1.3. Housing Stability Analysis

Housing stability is a key indicator of client well-being and service effectiveness. This section of the dashboard evaluates changes in client housing situations between program entry and exit, assigning a numerical Housing Stability Score (We did this manually) to each living situation based on a severity scale where higher values indicate more stable housing conditions. All analyses are conducted at the Family Collaborative level, meaning outcomes reflect the most stable housing situation among associated family members.

Using records with non-missing values for both entry and exit living situations, we assigned each living situation a score from 1 (least stable, e.g., unsheltered homelessness) to 13 (most stable, e.g., home ownership without subsidies). Please refer to **Appendix B** for detailed

information. A client's stability change was computed as the difference between tier exit and entry scores.

Key Metrics

- Average Stability Change: +2.13 points
- Clients with Improved Housing Stability: 55.5%
- Data Completeness: 19.1%

These metrics suggest a moderate improvement in client housing outcomes overall, although the relatively low data completeness highlights the need for improved tracking of the living situation field.

Then, we developed a cross-organization scatter plot **Appendix C** that compares NGOs on two dimensions: average stability change and the percentage of clients who improved. Organizations in the top-right quadrant, such as UWGN, exhibited high average gains and broad client improvement, signaling strong housing support outcomes. Bubble sizes represent the number of clients served, reflecting the scale of each organization's impact.

To enhance service delivery across the network, TechBridge can leverage the HomeBridger platform as a conduit for **peer learning and knowledge sharing**. These high-performing NGOs could be invited to share their case management strategies, housing intervention models, and data practices through the platform. Facilitating workshops, best-practice repositories, or cross-organizational mentorship programs could help lower-performing organizations adopt proven approaches, thereby elevating impact at scale.

4.1.4. Demographic Analysis

To assess equitable outcomes across racial and ethnic groups, we conducted a demographic analysis using the "Combined_Race" field (which is aggregated on the family level). This field contains self-reported racial identities, including multi-racial designations (e.g., "Black/Latinx"). These were parsed and split to enable race-level aggregation and outcome analysis across both individuals and family units, as shown in **Appendix I.**

We calculated success rates for each distinct racial or ethnic identity by measuring the percentage of goal outcomes marked as **"Achieved"** for entries associated with that group. Each client entry may contribute to multiple racial categories, ensuring full representation of multi-racial families.

Our results reveal some variation:

- Pacific Islander and Native Hawaiian clients had the highest success rates, each at 92.3%.
- White clients followed at 84.3%, with Asian clients at 78.6%.
- Most Hispanic/Latinx subgroups (e.g., Latinx, Latina, Latino, Latine) showed consistent success rates near 78.1%.
- African American and Black clients had lower success rates at 75.9%, despite being the most represented group.

Racial Composition of Clients **Appendix J:**

To understand client demographics, the overall racial composition was assessed across all entries, with each identity counted independently per entry. The distribution is summarized as follows:

- Black or African American identities appeared in 42.2% of entries, representing the most common racial designation.
- White identities were present in 10.6% of entries.
- Other racial/ethnic identities, including Asian, Pacific Islander, Native Hawaiian, and Hispanic/Latinx subgroups, each accounted for less than 1% individually.

Racial/Ethnic Composition by Organization **Appendix K:**

We also examined how client racial and ethnic representation varies across partner NGOs. The chart below presents the percentage distribution of racial identities within each organization, with multi-racial clients counted in all applicable categories. While some organizations, such as CC and SL, show a relatively high proportion of Black or African American clients, others, like WE, reflect a larger share of White clients. Several organizations also serve small but notable percentages of Asian, Pacific Islander, and Latinx-identifying clients. This breakdown provides context for comparing demographic reach and may inform future equity-focused analyses or outreach strategies.

TechBridge could use this information to help organizations benchmark their reach and explore tailored service approaches for underrepresented racial or ethnic groups.

4.1.5. Time Analysis

The time analysis reveals a strong correlation between the duration taken to address a goal and its likelihood of success. Goals that are successfully achieved tend to be resolved significantly faster, evidenced by a much lower median completion time (14 days) compared to goals that were not achieved (90 days). While both distributions are right-skewed, indicating some goals take a very long time regardless of outcome, the histogram clearly shows a larger volume of achieved goals clustered at shorter durations. This pattern generally holds across different service domains, where the average time for successful outcomes is typically lower than for unsuccessful ones. Critically, the data pinpoints the 90-180 day period as the window when goals are most likely to fail, showing a dramatic peak in failures during this time. Conversely, the highest success rate (85.5%) is associated with the shortest service duration (<30 days), with rates generally decreasing as duration extends, particularly dipping around the 3-6 month mark. This suggests that early intervention and rapid resolution are key drivers of success, while the 3-6 month period represents a critical high-risk phase where goals may falter and require additional focus or support to prevent failure.

4.1.6. Data Explorer Analysis

The category distribution analysis reveals that while Employment, Housing, Financial, and "Unknown" goals are most common overall, Financial and "Unknown" goals are disproportionately represented among failures, suggesting inherent challenges in financial goals and potential issues with clarity or tracking for "Unknown" ones. Significant data quality concerns arise from closure reasons: "Missing" is the top reason for successful goal closure (49.8%), indicating poor outcome documentation, while paradoxically, "Completed Program" is the primary reason for unsuccessful closures (46.7%), pointing to a disconnect between program completion and actual goal achievement or flawed categorization. Furthermore, "Unable to contact" is notably higher for unsuccessful goals (13.1%), linking client disengagement to failure. Collectively, these insights necessitate refining goal definitions (especially "Unknown"), drastically improving closure data accuracy, and investigating why program completion doesn't consistently equate to perceived success.

4.2. Financial Analysis

In addition to the dashboard analysis, we decided to assess the flow of financial assistance programs, conducting an analysis focusing on the distribution, trends, and forecasting of financial resources provided to various organizations and benefit channels. Initially, we reviewed correlations between different income support channels, highlighting areas of significant overlap **(Appendix D)**. This analysis helped identify benefit channels that might contain similar criteria, pinpointing opportunities for better integration and streamlining of program eligibility and enrollment. We also observed minimal correlations between certain income support channels, indicating that these benefit programs may have distinct qualification criteria or differing program objectives. Negative correlations suggest that some programs may be substituted for one another. An example of this is OTHER_CASH__C and FOOD_STAMPS__C, suggesting that these other cash benefits are often being used to purchase food items. Overall, this analysis gives a better picture of who needs what type of assistance, and potentially what other forms of income support they may qualify for based on their existing needs.

Next, we conducted an in-depth review of grant allocations and historical financial assistance trends to identify patterns and inform strategic planning of funds. The analysis of the top 10 grants revealed substantial differences in how funds were distributed across partner organizations, highlighting both the primary recipients of funding and the specific grants that significantly influenced organizational budgets **(Appendix E)**. This is particularly useful to identify which organizations are providing which type of assistance to those in need, and the Homebridger data-sharing platform allows non-profits and housing agencies to funnel those in need to the agency that is using the grant that will assist them most. Moreover, the monthly trend analysis of these grants pinpointed distinct periods of high activity, notably a sharp increase in fund disbursement around September 2024 **(Appendix F)**. To gain an insight into how financial assistance funds are spent, we utilized historical monthly financial assistance flow data as the basis for forecasting future spending **(Appendix G)**. Using time series modeling techniques, specifically the Prophet forecasting method, we analyzed the monthly trends, accounting for seasonality and historical spending fluctuations **(Appendix H)**. This allowed us to project a stable spending range of approximately $70,000 to $100,000 per month, with an uncertainty margin of about $30,000. This comprehensive forecasting approach provides stakeholders with

clear visibility into future financial flows, enabling more precise budgeting, proactive resource allocation, and better preparedness for funding fluctuations.

4.3. Living Situation Analysis

To understand the effectiveness of Techbridge's resources, we analyzed the before and after living situations of the applicants to determine whether their living conditions improved, declined, or remained unchanged. For a clear understanding, we extracted only the completed cases. In this dataset, we had access to the living situation for the applicants before TechBridge and after the resources had been given. From there, we analyzed all the explicit outcomes of these applicants under each category of living situation. For example, we saw that a majority of people who were under the 'Rental by Client, no ongoing housing subsidy' category before undergoing TechBridge's application ended up changing their living situation and moving into the 'Rental by Client, with other ongoing housing subsidy [including RRH]' category after. It is vital to mention that to simplify the analysis and make the results more comprehensible, we only looked into living situation categories that were seen in both the before and after living situation columns. In other words, we did not include any living situation categories that were seen in the initial response of applicants enrolling in TechBridge's program, but not in the later responses after the program, and vice versa.

There were more drastic differences witnessed during the process amongst applicants' living situations. For example, some of the applicants at the beginning of the application claimed to be staying or living with family permanently. This was no longer a category seen after the program. Furthermore, when specifically looking at the top 4 most common categories seen at the beginning of the application, we see many applicants describing their living situation as a 'place not meant for habitation.' Positively so, this was no longer the place after undergoing TechBridge's program. Additionally, we can see that at the beginning, another common category was 'Hotel/motel paid for without an emergency shelter voucher.' At the end of the program, however, this was no longer in the top 4 most common living situation categories. Instead, we see a drastic increase in rentals by clients with ongoing housing subsidies, with RRH, and with no ongoing housing subsidy. We can then see that although the change might not be drastic, many applicants saw an improvement in their housing situation, making this a reflection of TechBridge's effectiveness.

4.4. Service Optimization

4.4.1 Family Clustering

To better align services to family needs and allocate available resources more effectively, we grouped families based on their assessment scores and needs at the time of program entry. Only assessments marked as 'Initial' in the ASSESSMENT_TIME_POINT__C field were retained to reflect families' initial conditions. Out of 42 assessment variables, 18 were selected, each representing a specific domain of need, such as housing, income, food, mental health, childcare, and education.

The assessment responses were recorded as strings (Appendix L). Accordingly, we extracted numeric values from these fields to convert them into a standardized format for analysis. Assessment scores ranged from 1 to 5, where a score of 1 indicated the highest level of need and 5 indicated no need for support. All selected features were then standardized using z-score normalization to ensure equal weighting in the clustering process.

K-Means clustering was then performed on the standardized assessment data. The optimal number of clusters (k=4) was selected based on the elbow method (Appendix M). Families were grouped according to similarity, as captured by the assessment features. The resulting clusters were interpreted as four profiles of need (Appendix N). For an accurate representation of need levels, zeros in the CHILD_CARE_ASSM__C and CHILDRENS_EDUCATION_ASSM__C fields were excluded from mean calculations when compiling cluster profiles, as they represent non-applicable responses.

According to the cluster profiles, Cluster 2 demonstrates the most extensive needs, with the lowest scores in legal support, mobility, income, housing, and food. Families in this group may require urgent and coordinated support across these areas. Cluster 0 consists of families facing challenges in specific domains such as employment, housing, and food. While their needs are more concentrated than those in Cluster 2, they are fundamental to daily functioning and may require targeted intervention. Cluster 1 is more stable overall but has the lowest scores in employment and income, highlighting a need for services that focus on achieving economic stability. Cluster 3 is the most stable across all domains, with relatively lower scores in food and child care. Families in this group are well-positioned for success with minimal intervention.

4.4.2 Service List

To understand how service delivery patterns relate to outcomes, we compared service engagement between families who completed the program and those who did not. Program completion was treated as a proxy for success, such as securing stable housing. A family was considered successful if either the REASON_CLOSED__C or CLOSURE_REASON__C field indicated 'Completed Program,' after receiving at least one service. Families marked as 'Active' or 'Enrollment In Process' in the PMDM__STAGE__C field were excluded from the analysis, as these families had not yet exited the program.

For each family, the number of sessions was aggregated by service type to allow comparisons of average service engagement between successful and unsuccessful families. Service types were defined by combining the session format (SESSION_FORMAT__C) with the service topic extracted from the field SERVICES_RECEIVED_SELECT_ALL_THAT_APPLY__C. This process captured both what service was delivered and how it was delivered.

To account for the influence of outliers, the summarize_session_counts function calculated the total number of sessions per family and applied the interquartile range (IQR) method to exclude extreme values. Families with total session counts exceeding 1.5 times the IQR above the third quartile were removed. This filtering established a baseline for identifying which services were most common, how delivery formats differed by outcome, and whether certain clusters received more or fewer sessions of specific services.

Among families who completed the program, Family Coaching, Housing Services, and Employment Navigation were the most frequently delivered services, with an average of 18, 5, and 5.5 sessions per family, respectively. On average, these families received 36.75 total sessions, with 2.60 sessions per service, across all clusters. Services were typically delivered over multiple sessions, suggesting stronger and more sustained engagement. In contrast, families with unsuccessful outcomes received an average of 25.75 total sessions and 1.63 sessions per service, often limited to one-time or irregular engagement.

When comparing service delivery formats, no statistically significant difference was found in program success rates across in-person, phone, or virtual formats. A chi-square test of independence yielded a p-value of 0.150 ($\chi^2 = 5.32$, df = 3), indicating that success rates did not vary meaningfully by session format. This supports the interpretation that frequency and

consistency of engagement, rather than delivery format alone, are more closely associated with program completion.

Cluster 0 had a moderate success rate of 27.91% (36 of 129 families), with both successful and unsuccessful families receiving an average of 35 sessions (Appendix O). This suggests that while service engagement was balanced, frequency alone may not be enough. Services may need to be more tailored to the group's needs in areas such as employment, housing, and food.

Cluster 1 had the lowest overall success rate, at 21.80% (46 of 211 families), and an evident gap in service engagement between successful and unsuccessful families. While successful families in this cluster received an average of 40 sessions, those who did not complete the program averaged only 23. This marked discrepancy indicates that for families with moderate needs, consistent and sustained service engagement may be crucial for successful program completion.

Cluster 2, the smallest group, had one of the lowest success rates at 23.81% (10 of 42 families) despite receiving an average of 41 sessions. Families in this group received frequent Family Coaching and Employment Navigation sessions, yet still showed little improvement in outcomes, suggesting that current service models may not be sufficient to address their needs.

Cluster 3 had the highest number of successful exits (71 of 177 families), with successful families averaging 31 sessions compared to 22 for those who did not complete the program. While this group had greater stability, the results suggest that even in stable clusters, consistent and sustained service engagement may still be linked to better outcomes.

This service list analysis highlights the importance of aligning service offerings with the varying needs of families at program entry. The patterns of service engagement reveal that success is not determined solely by the number of sessions delivered, but rather by the consistency, relevance, and intensity of those services in relation to each family's specific needs. The clustering profiles can help inform more targeted service planning, ensuring that the most appropriate types and levels of support are delivered to those who need them most.

4.4.3 Service Path

We further analyzed the full service path taken by families from each situation cluster to get a more thorough understanding of the sequence of services that led to success. Additionally,

we compared service paths between families that reached their goals and those who did not, observing distinct patterns across clusters.

While family coaching appeared frequently across all clusters, Cluster 0's successful families typically followed a path centered around recurrent housing services, with employment navigation introduced only after housing stability was secured. This suggests that addressing foundational needs like shelter first led to better outcomes. In contrast, failed cases in this cluster tended to have shorter service paths that included a wider variety of service types, potentially indicating a lack of sustained focus or continuity in addressing core issues.

Cluster 1 success was marked by recurrent family coaching, highlighting the importance of ongoing support and engagement in family dynamics. Failure paths in this cluster were also short but featured fewer services overall, pointing to limited interaction with the support system, which may have hindered progress.

In Cluster 2, successful families again leaned heavily on recurrent housing services, reinforcing the role of housing stability as a key driver of success. Conversely, failed cases involved much longer service paths, sometimes including more complex interventions like mental health services. This may reflect families facing more challenging or multifaceted barriers.

Cluster 3 success paths were primarily composed of phone call sessions, with family coaching playing a major role, suggesting that less intensive but consistent remote support was effective. However, failure paths in this cluster were much longer than average, which might imply prolonged engagement without resolution, possibly due to inefficient service matching or persistent unmet needs.

6. Recommendation/Suggestions

6.1 Dashboard Insights

- Focus improvement efforts on domains with lower success rates, particularly Adult Education (55.5%) and Financial Services (69.7%), by developing specialized training and resources.
- Implement targeted intervention protocols for clients in the 90-180 day service window, when goal failure rates peak significantly.

- Enhance housing support services for clients in emergency shelter situations, who currently show lower success rates (87.1%) compared to other housing scenarios.
- Address racial disparities in outcomes by investigating why Black/African American clients experience lower success rates (75.9%) despite being the most represented demographic group.

6.2 Financial Analysis

- Optimize allocation of financial resources by leveraging the observed negative correlation between OTHER_CASH__C and FOOD_STAMPS__C to better target assistance types.
- Develop contingency funding plans for seasonal spikes in demand, particularly the September peak identified in our trend analysis.
- Use the Prophet forecasting model to establish monthly budget guidelines within the projected $70,000-$100,000 range, with appropriate reserves for the $30,000 uncertainty margin.
- Create a coordinated grant management system across participating NGOs to reduce duplication and maximize the collective impact of available funding.

6.3 Living Situation Analysis

- Prioritize transition pathways from "place not meant for habitation" to rental situations with appropriate subsidies, building on observed successful housing progression patterns.
- Develop specialized intervention strategies for clients initially in "Hotel/motel paid without emergency shelter voucher" situations to accelerate their movement to more stable housing.
- Enhance data collection practices to reduce the high percentage of "Missing" living situation designations, which currently limit full understanding of housing trajectory patterns.
- Establish standardized metrics for measuring incremental improvements in housing stability to better track progress across the housing stability continuum.

6.4 Service Optimization

- Implement the family clustering model, with four distinct need profiles, for intake assessment to more effectively tailor service packages to specific client needs.
- Adopt differentiated service sequencing based on cluster membership, prioritizing housing services for Clusters 0 and 2, and intensive family coaching for Clusters 1 and 3.
- Increase session frequency and consistency, particularly for families in Cluster 1, where successful cases received nearly twice as many service sessions (40) as unsuccessful ones (23).
- Develop specialized intervention approaches for Cluster 2 families, who showed low success rates despite receiving high service volumes, suggesting current service models may be insufficient for their complex needs.

7. Conclusion

Our comprehensive analysis of the HomeBridger dataset has revealed valuable insights into service delivery effectiveness across the TechBridge collaborative network. The interactive dashboard analysis demonstrated clear patterns in service success and failure, with significant variations across domains, living situations, and demographics. Financial analysis identified opportunities for optimized resource allocation and provided reliable forecasting for future planning. Our living situation trajectory analysis confirmed that HomeBridger's interventions are generally improving housing stability, though with varying effectiveness across different initial housing circumstances. Finally, our service optimization approach, incorporating family clustering and service path analysis, identified four distinct need profiles requiring tailored intervention strategies.

Despite these valuable findings, our analysis faced significant limitations due to data quality issues, particularly regarding missing values in critical fields like living situations, closure reasons, and demographic information. These gaps constrained our ability to draw more definitive conclusions in some areas and highlight the urgent need for improved data collection practices across participating organizations.

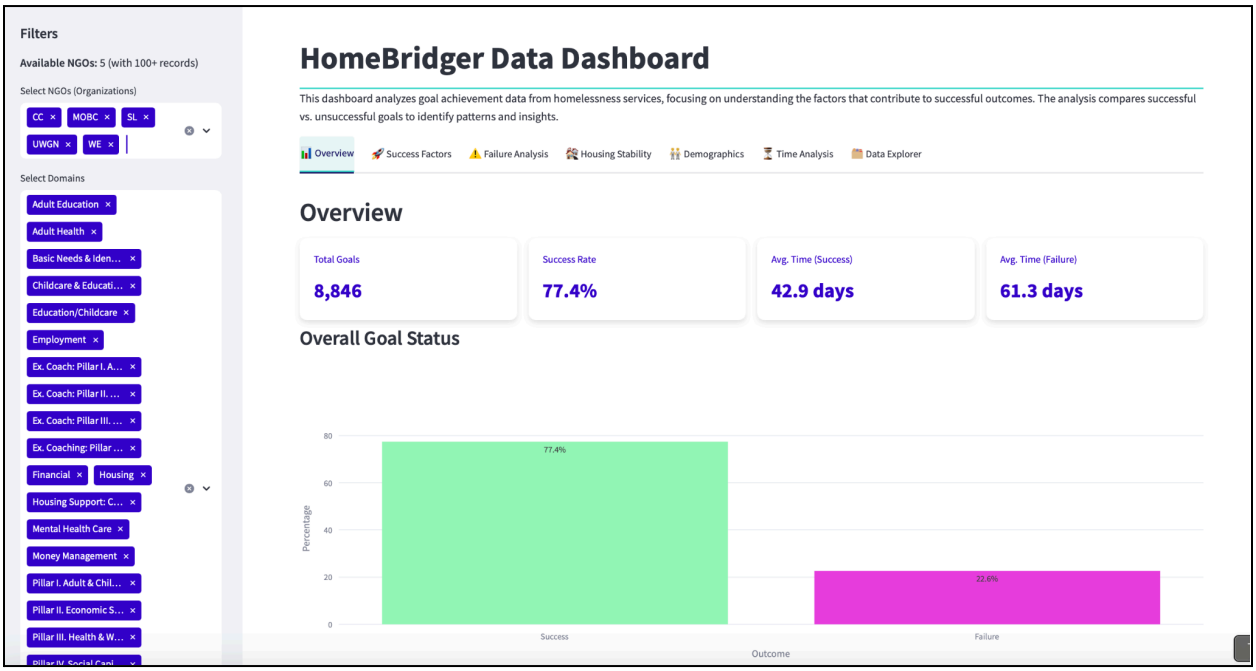
Moving forward, TechBridge and its partner NGOs should focus on implementing our targeted recommendations to enhance service delivery while simultaneously improving data quality. Establishing a continuous improvement cycle—where data informs practice and practice

generates better data—will be essential for maximizing collective impact. Additionally, expanding the platform's analytical capabilities to include real-time predictive modeling could further transform service delivery by enabling proactive interventions before clients reach critical failure points.

As the HomeBridger ecosystem matures, this data-driven approach to collaborative service delivery has the potential to fundamentally transform how social service organizations address complex client needs, ultimately leading to more sustainable improvements in housing stability and family wellbeing across the communities served.

Appendix A

DashBoard Overview



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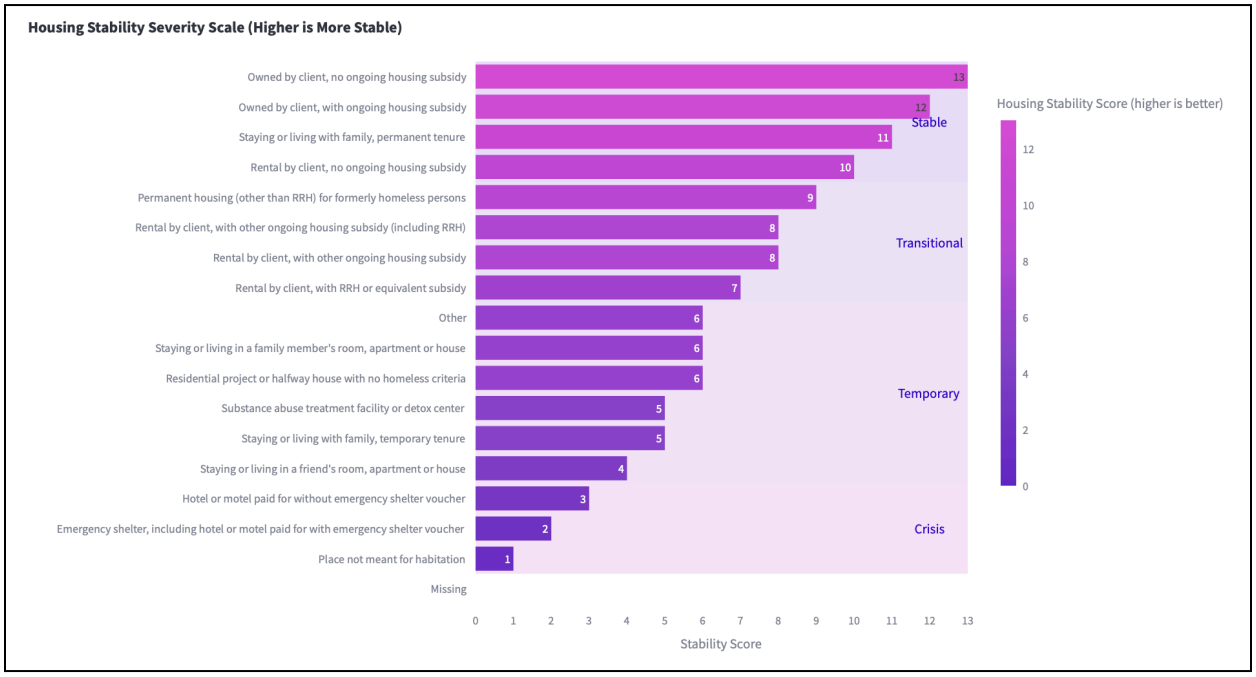
Appendix B

Housing Situation Scale



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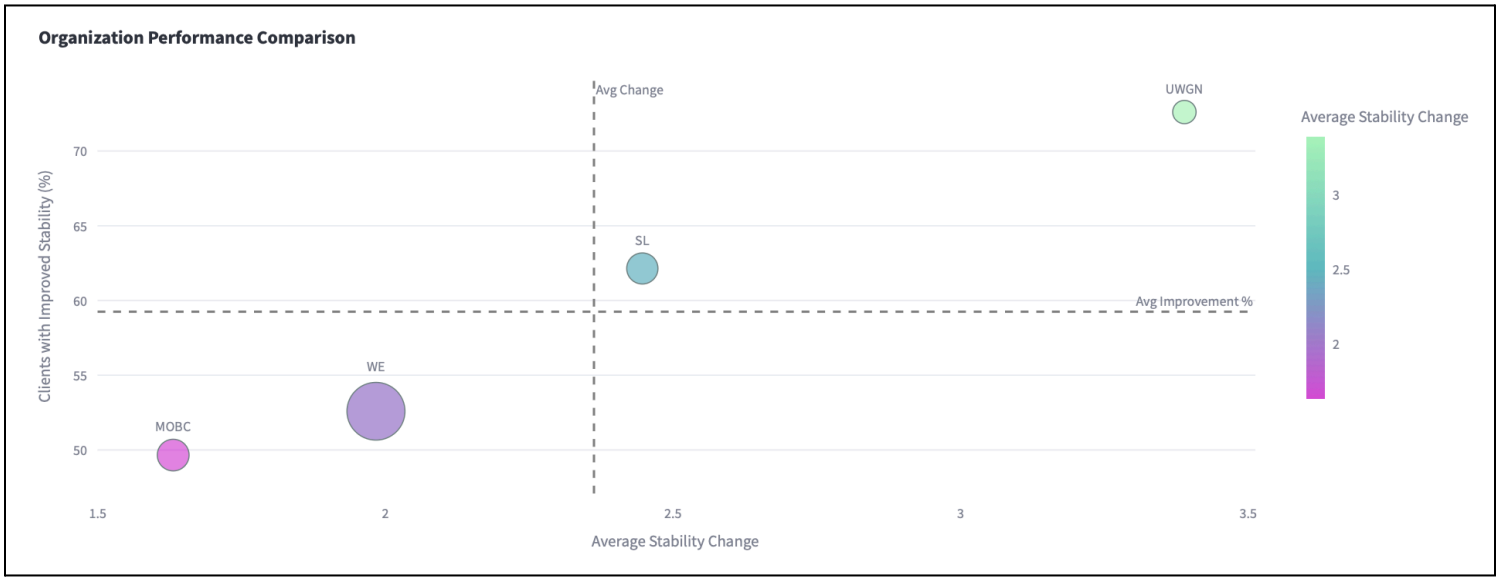
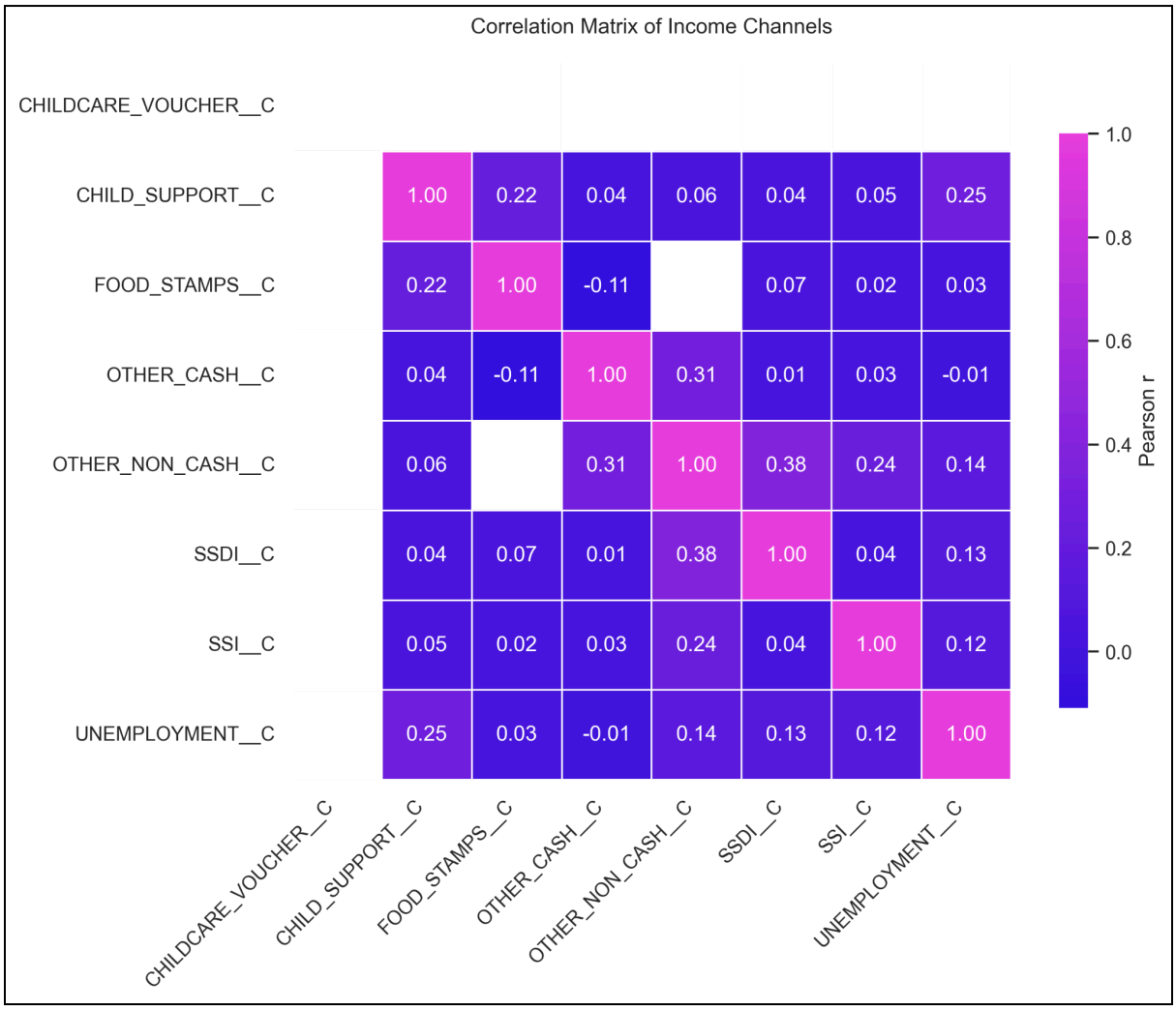
Appendix C

Cross-Organization Comparison



Appendix D

Income Channel Matrix



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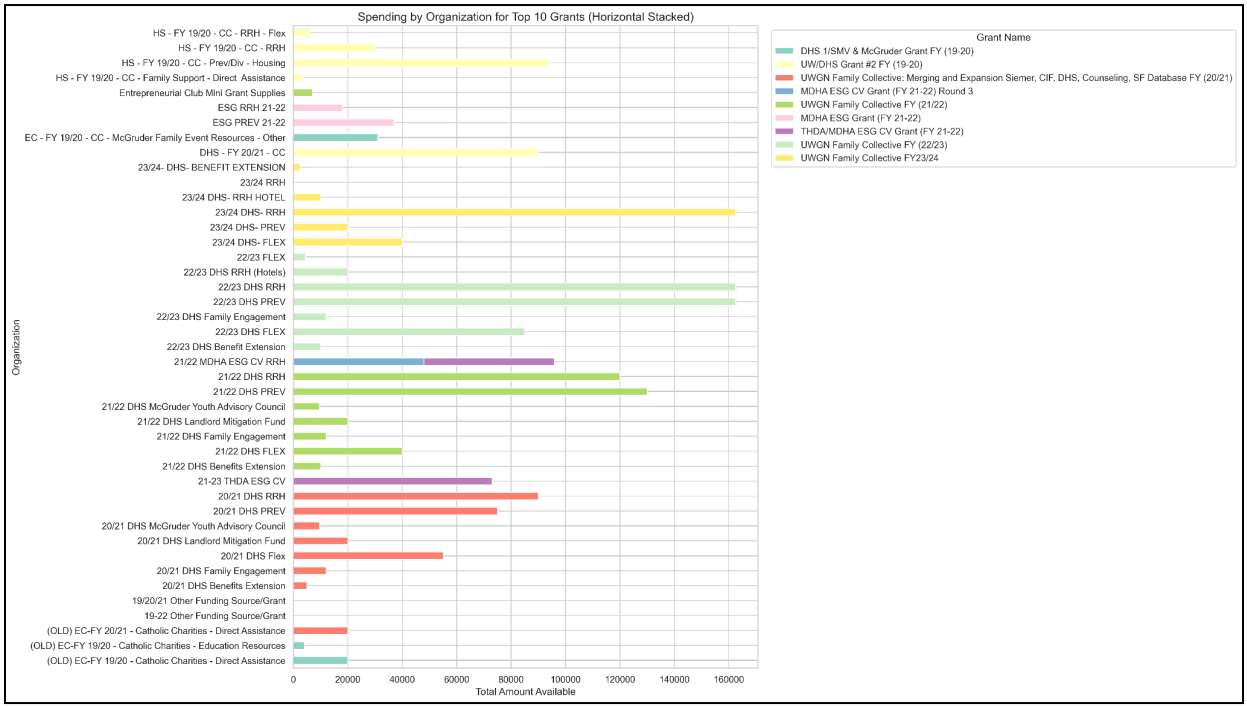
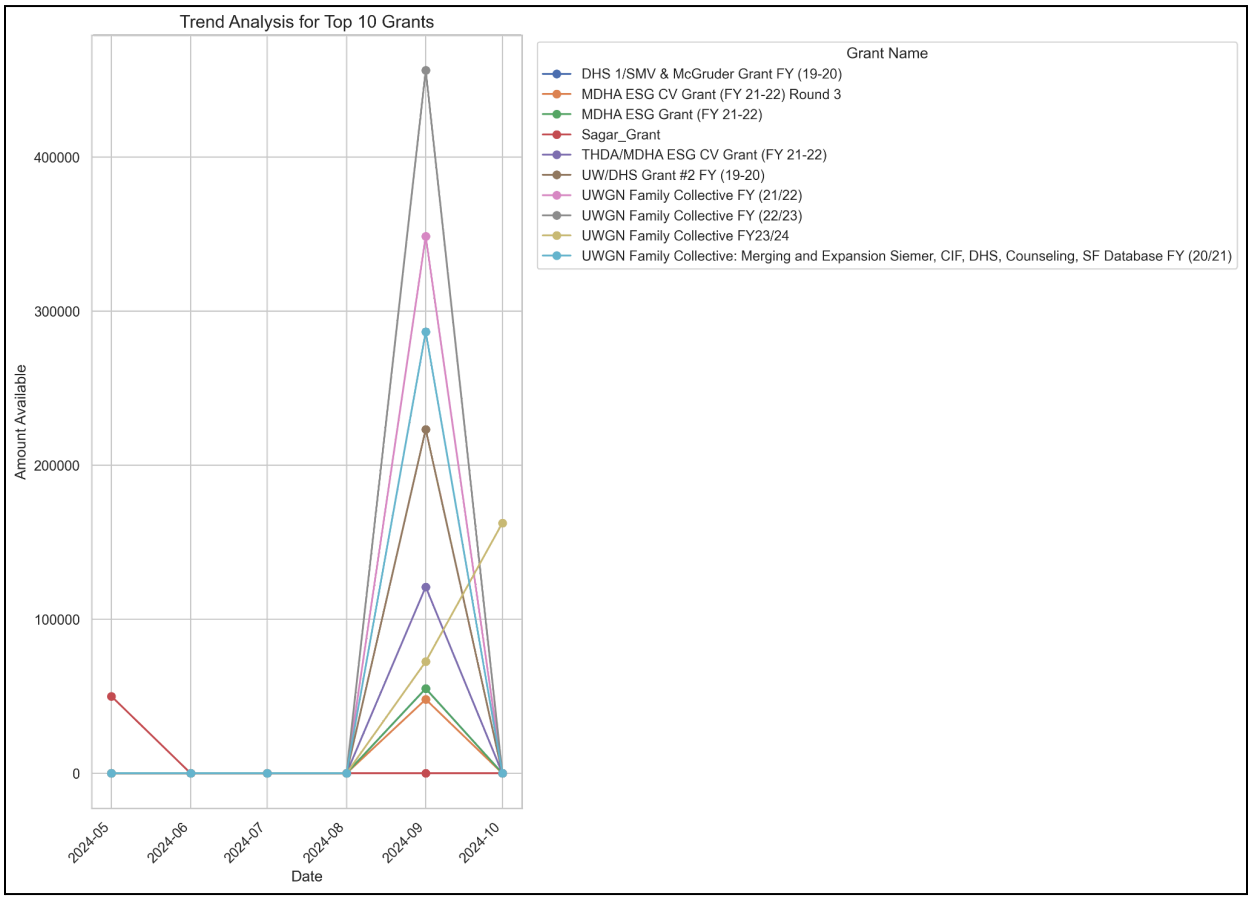
Appendix E

Grant Allocation by Agencies



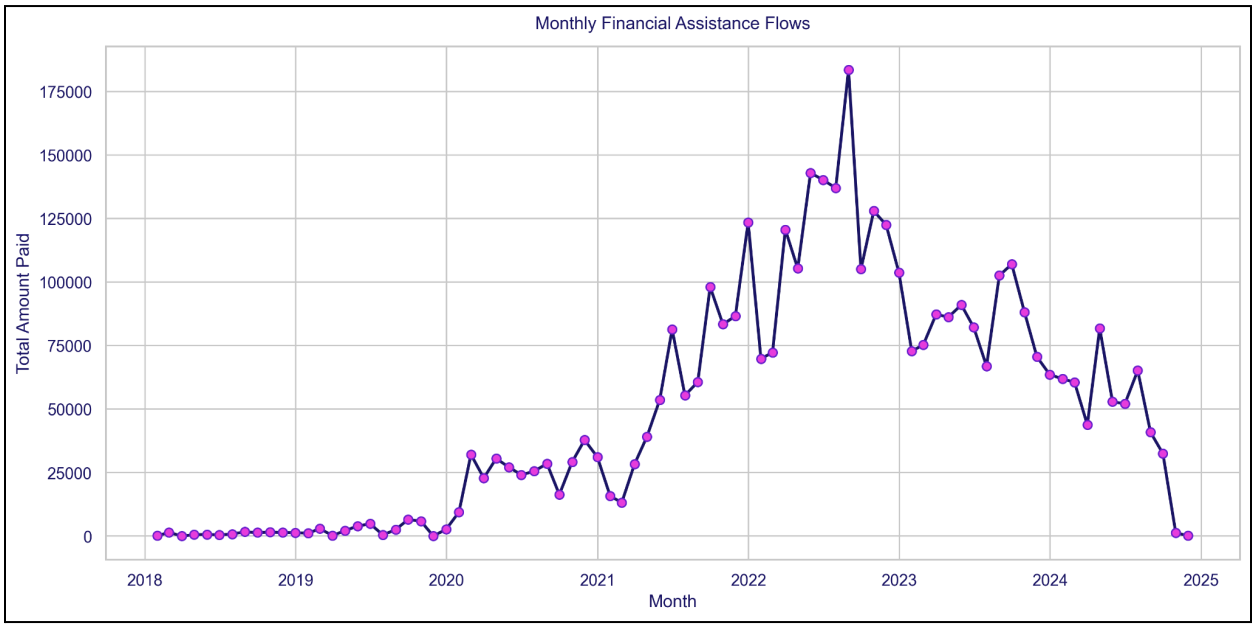
Appendix F

Temporal Trend Top 10 Grants



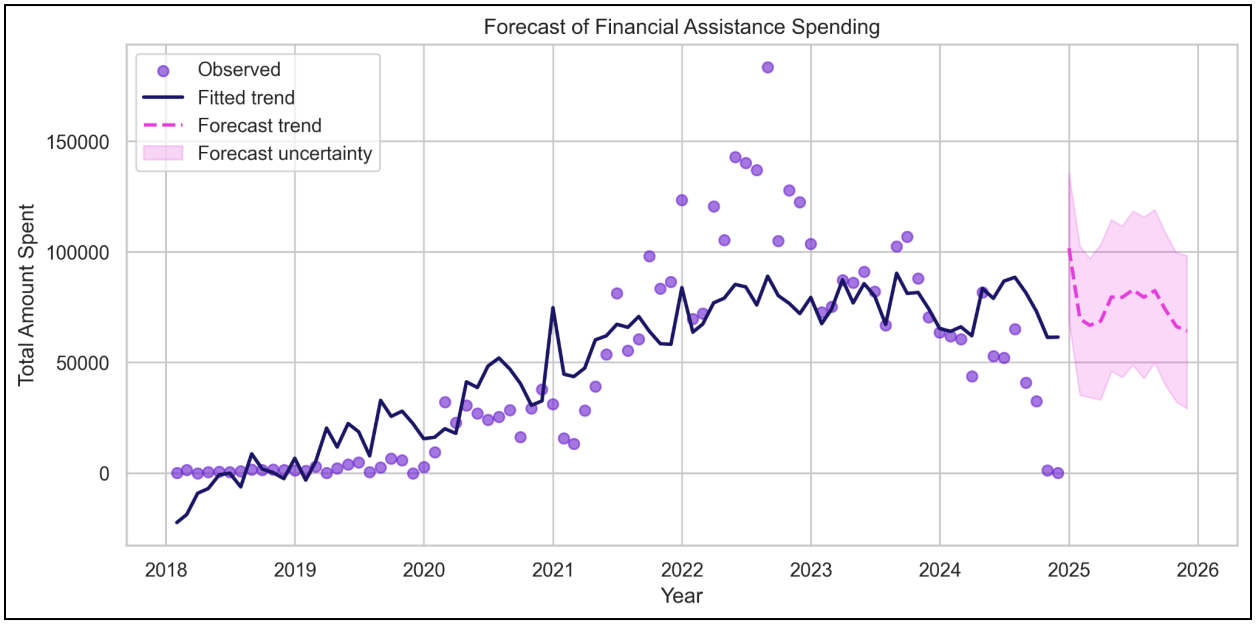
Appendix G

Monthly Financial Assistance Flows



Appendix H

Financial Assistance Forecast



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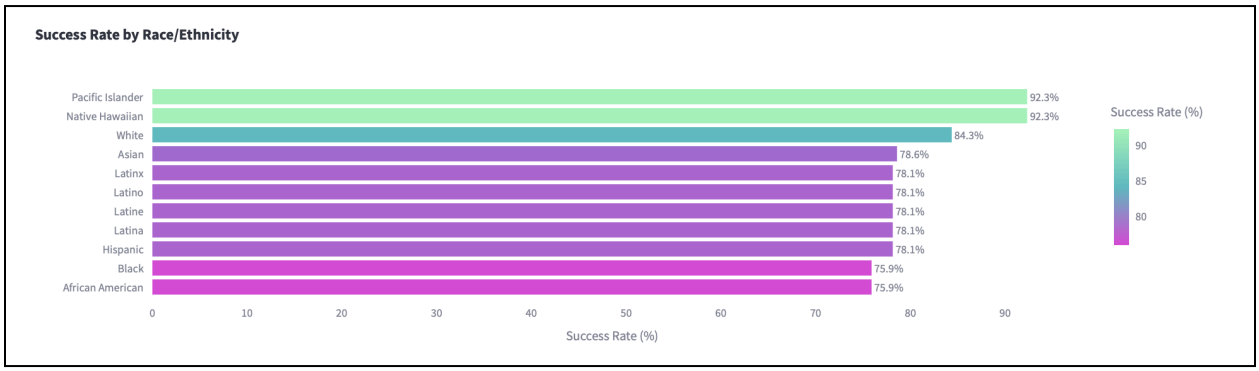
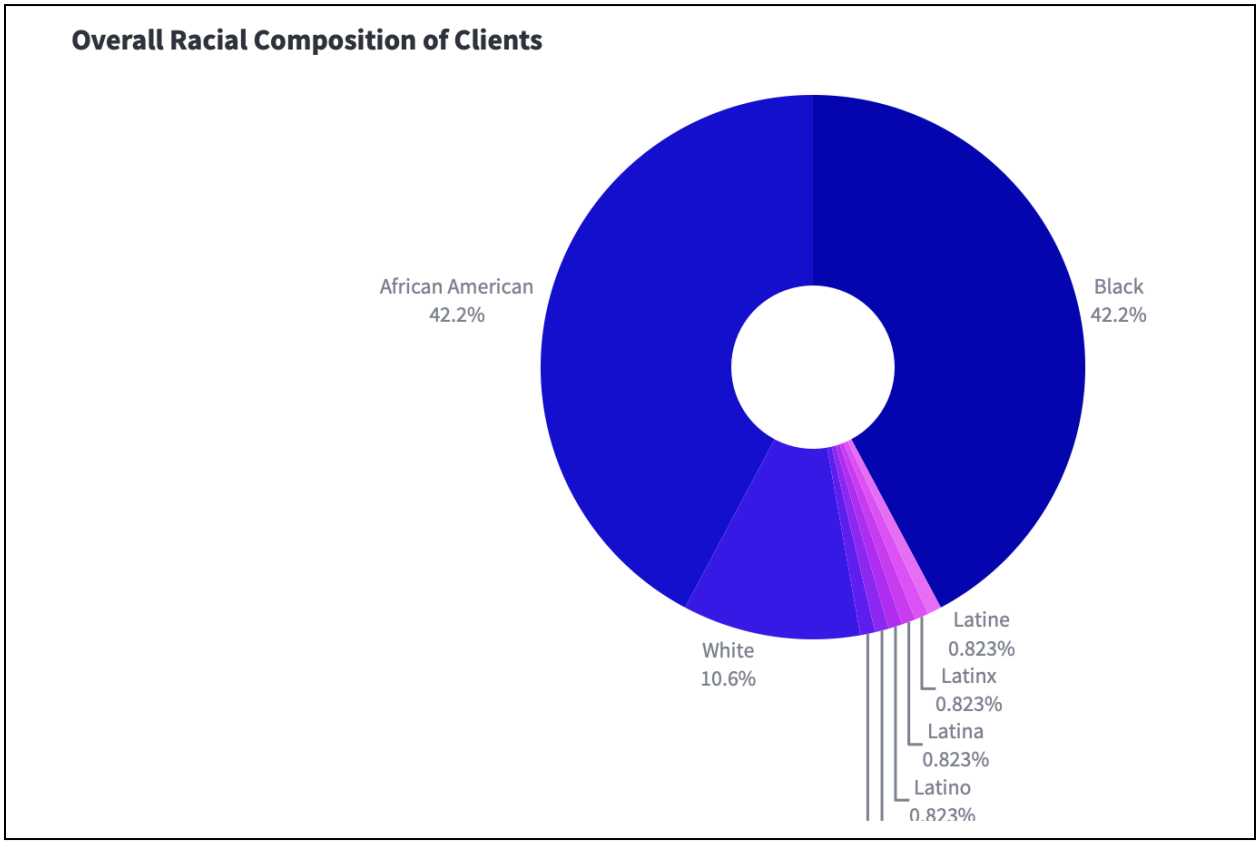
Appendix I

Success Rate by Race/Ethnicity



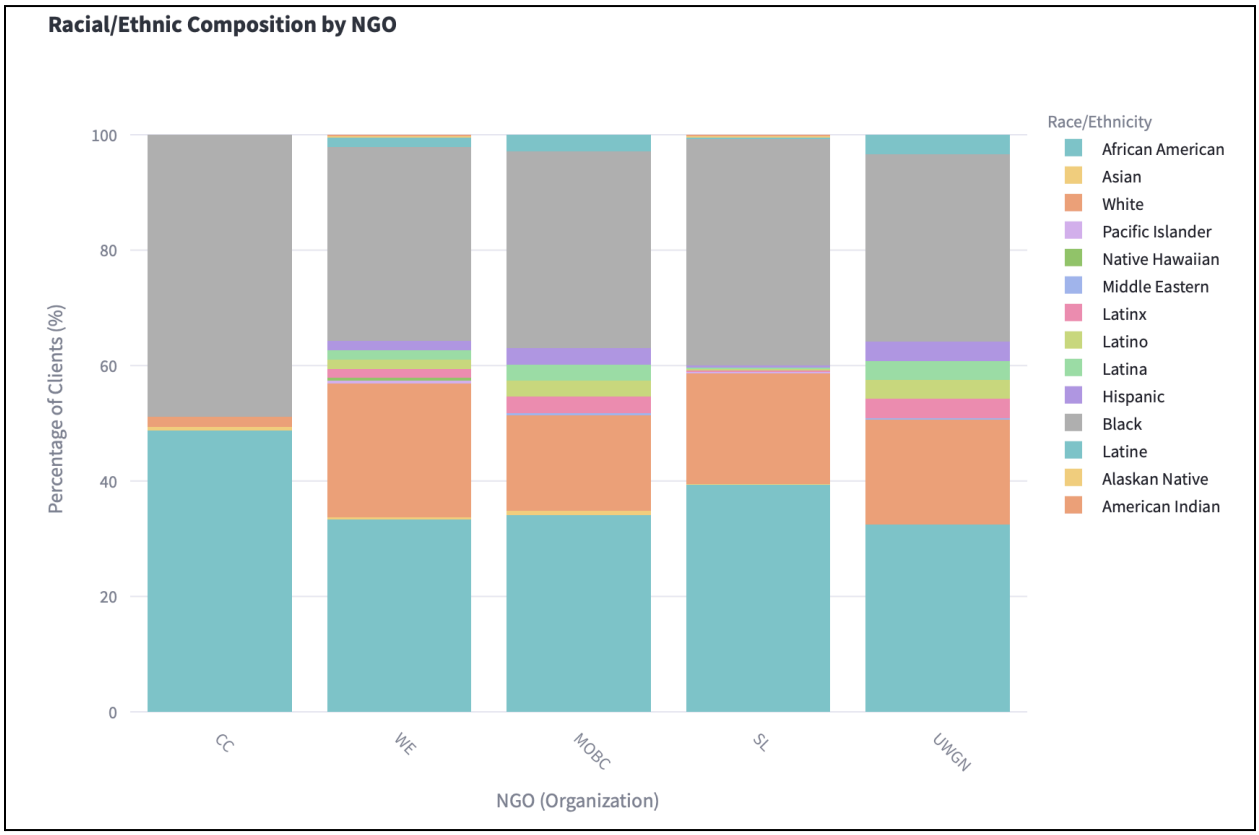
Appendix J

Overall Racial Composition



Appendix K

Racial Composition by NGOs



Appendix L

Original Assessment Responses

Field	Assessment Domain	Original (String) Responses
ADULT_EDUCATION_ASSM__C	Adult Education	1 - Literacy problems and/or no high school diploma/GED are serious barriers to employment.
		2 - Enrolled in literacy and/or GED program and/or has sufficient command of English to where language is not a barrier to employment.
		3 - Has high school diploma/GED.
		4 - Needs additional education/training to improve employment situation and/or to resolve literacy problems to where they are able to function effectively in society.
		5 - Has completed education/training needed to become employable. No literacy problems.
CHILD_CARE_ASSM__C	Child Care	0 - N/A
		1 - Needs childcare, but none is available/accessible and/or child is not eligible.
		2 - Childcare is unreliable or unaffordable, inadequate supervision is a problem for childcare that is available.
		3 - Affordable subsidized

		childcare is available, but limited.
		4 - Reliable, affordable childcare is available, no need for subsidies.
		5 - Able to select quality childcare of choice.
CHILDRENS_EDUCATION_ASSM__C	Children's Education	0 - N/A
		1 - One or more school-aged children not enrolled in school.
		2 - One or more school-aged children enrolled in school, but not attending classes.
		3 - Enrolled in school, but one or more children only occasionally attending classes.
		4 - Enrolled in school and attending classes most of the time.
		5 - All school-aged children enrolled and attending on a regular basis.
COMMUNITY_INVOLVEMENT_ASSM__C	Community Involvement	1 - Not applicable due to crisis situation; in "survival" mode.
		2 - Socially isolated and/or no social skills and/or lacks motivation to become involved.
		3 - Lacks knowledge of ways to become involved.
		4 - Some community involvement (advisory group,

		support group), but has barriers such as transportation, childcare issues.
		5 - Actively involved in community.
DISABILITIES_ASSM__C	Disabilities	1 - In crisis – acute or chronic symptoms affecting housing, employment, social interactions, etc.
		2 - Vulnerable – sometimes or periodically has acute or chronic symptoms affecting housing, employment, social interactions, etc.
		3 - Safe – rarely has acute or chronic symptoms affecting housing, employment, social interactions, etc.
		4 - Building Capacity – asymptomatic – condition controlled by services or medication
		5 - Thriving – no identified disability.
EMPLOYMENT_ASSM__C	Employment	1 - No job.
		2 - Temporary, part-time or seasonal; inadequate pay, no benefits.
		3 - Employed full time; inadequate pay; few or no benefits.
		4 - Employed full time with adequate pay and benefits.
		5 - Maintains permanent employment with adequate

		income and benefits.
FAMILY_SOCIAL_ASSM__C	Family Social	1 - Lack of necessary support from family or friends; abuse (DV, child) is present or there is child neglect.
		2 - Family/friends may be supportive, but lack ability or resources to help; family members do not relate well with one another; potential for abuse or neglect.
		3 - Some support from family/friends; family members acknowledge and seek to change negative behaviors; are learning to communicate and support.
		4 - Strong support from family or friends. Household members support each other's efforts.
		5 - Has healthy/expanding support network; household is stable and communication is consistently open.
FOOD_ASSM__C	Food	1 - No food or means to prepare it. Relies to a significant degree on other sources of free or low-cost food.
		2 - Household is on food stamps.
		3 - Can meet basic food needs, but requires occasional assistance.
		4 - Can meet basic food needs without assistance.

		5 - Can choose to purchase any food household desires.
HEALTH_CARE_COVERAGE_ASSM__C	Health Coverage	1 - No medical coverage with immediate need.
		2 - No medical coverage and great difficulty accessing medical care when needed. Some household members may be in poor health.
		3 - Some members (e.g. Children) have medical coverage.
		4 - All members can get medical care when needed, but may strain budget.
		5 - All members are covered by affordable, adequate health insurance.
HOUSING_ASSM__C	Housing	1 - Homeless or threatened with eviction
		2 - In transitional, temporary or substandard housing; and/or current rent/mortgage payment is unaffordable (over 30% of income).
		3 - In stable housing that is safe but only marginally adequate.
		4 - Household is in safe, adequate subsidized housing.
		5 - Household is safe, adequate, unsubsidized housing.
INCOME_ASSM__C	Income	1 - No income.
		2 - Inadequate income and/or

		spontaneous or inappropriate spending.
		3 - Can meet basic needs with subsidy; appropriate spending.
		4 - Can meet basic needs and manage debt without assistance.
		5 - Income is sufficient, well managed; has discretionary income & able to save.
LEGAL_ASSM__C	Legal	1 - Current outstanding tickets or warrants.
		2 - Current charges/trial pending, noncompliance with probation/parole.
		3 - Fully compliant with probation/parole terms.
		4 - Has successfully completed probation/parole within past 12 months, no new charges filed.
		5 - No active criminal justice involvement in more that 12 months and/or no felony criminal history.
LIFE_SKILLS_ASSM__C	Life Skills	1 - Unable to meet basic needs such as hygiene, food, activities of daily living.
		2 - Can meet a few but not all needs of daily living without assistance.
		3 - Can meet most but not all daily living needs without assistance.

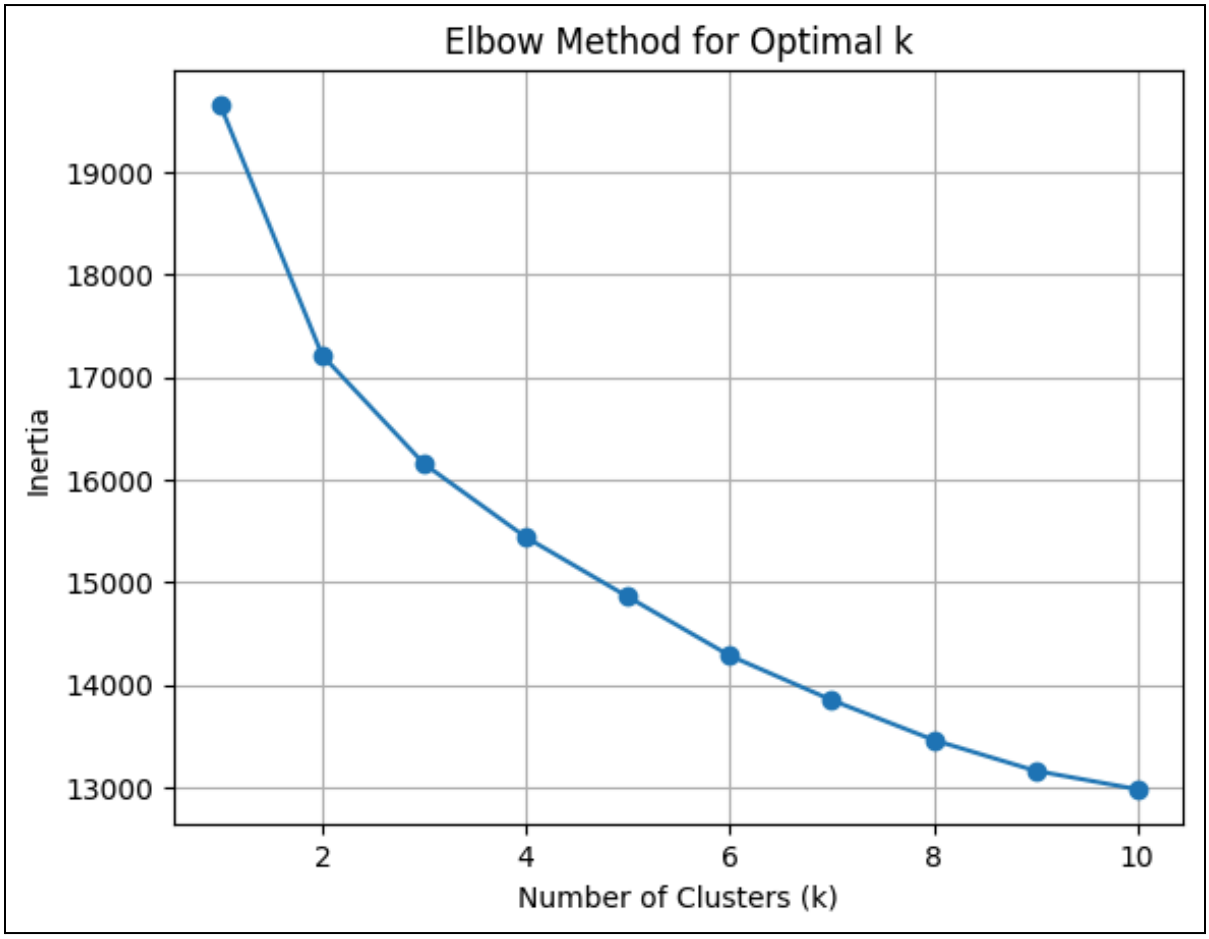
		4 - Able to meet all basic needs of daily living without assistance.
		5 - Able to provide beyond basic needs of daily living for self and family.
MENTAL_HEALTH_ASSM__C	Mental Health	1 - Danger to self or others; recurring suicidal ideation; experiencing severe difficulty in day-to-day life due to psychological problems.
		2 - Recurrent mental health symptoms that may affect behavior, but not a danger to self/others; persistent problems with functioning due to mental health symptoms.
		3 - Mild symptoms may be present but are transient; only moderate difficulty in functioning due to mental health problems.
		4 - Minimal symptoms that are expectable responses to life stressors; only slight impairment in functioning.
		5 - Symptoms are absent or rare; good or superior functioning in wide range of activities; no more than every day problems or concerns.
MOBILITY_ASSM__C	Mobility	1 - No access to transportation, public or private; may have car that is inoperable.
		2 - Transportation is available, but unreliable, unpredictable, unaffordable;

		may have care but no insurance, license, etc.
		3 - Transportation is available and reliable, but limited and/or inconvenient; drivers are licensed and minimally insured.
		4 - Transportation is generally accessible to meet basic travel needs.
		5 - Transportation is readily available and affordable; car is adequately insured.
PARENTING_SKILLS_ASSM__C	Parenting Skills	1 - There are safety concerns regarding parenting skills.
		2 - Parenting skills are minimal.
		3 - Parenting skills are apparent but not adequate.
		4 - Parenting skills are adequate.
		5 - Parenting skills are well developed.
SAFETY_ASSM__C	Safety	1 - Home or residence is not safe; immediate level of lethality is extremely high; possible CPS involvement.
		2 - Safety is threatened/temporary protection is available; level of lethality is high.
		3 - Current level of safety is minimally adequate; ongoing safety planning is essential.
		4 - Environment is safe,

		however, future of such is uncertain; safety planning is important.
		5 - Environment is apparently safe and stable.
SUBSTANCE_ABUSE_ASSM__C	Substance Abuse	1 - Meets criteria for severe abuse/dependence; resulting problems so severe that institutional living or hospitalization may be necessary.
		2 - Meets criteria for dependence; preoccupation with use and/or obtaining drugs/alcohol; withdrawal or withdrawal avoidance behaviors evident; use results in avoidance or neglect of essential life activities.
		3 - Use within last 6 months; evidence of persistent or recurrent social, occupational, emotional or physical problems related to use (such as disruptive behavior or housing problems); problems have persisted for at least one month.
		4 - Client has used during last 6 months, but no evidence of persistent or recurrent social, occupational, emotional, or physical problems related to use; no evidence of recurrent dangerous use.
		5 - No drug use/alcohol abuse in last 6 months.

Appendix M

Elbow Method for KNN



Appendix N

Average Assessment Scores by Cluster at Program Entry (Scale from 1 to 5)

Field	Assessment Domain	Cluster 0	Cluster 1	Cluster 2	Cluster 3
ADULT_EDUCATION_ASSM__C	Adult Education	3.08	3.06	2.89	3.86
CHILD_CARE_ASSM__C	Child Care	2.52	2.14	2.33	3.40
CHILDRENS_EDUCATION_ASSM__C	Children's Education	4.37	4.43	4.11	4.71
COMMUNITY_INVOLVEMENT_ASSM__C	Community Involvement	2.08	2.71	2.05	3.41
DISABILITIES_ASSM__C	Disabilities	2.87	4.83	3.68	4.74
EMPLOYMENT_ASSM__C	Employment	1.97	1.61	2.06	3.31
FAMILY_SOCIAL_ASSM__C	Family Social	2.19	2.68	2.11	3.43
FOOD_ASSM__C	Food	2.00	2.04	2.00	3.00
HEALTH_CARE_COVERAGE_ASSM__C	Health Coverage	4.29	4.13	3.67	4.50

HOUSING_ASSM__C	Housing	1.86	2.53	1.80	3.17
INCOME_ASSM__C	Income	2.26	1.82	2.06	3.20
LEGAL_ASSM__C	Legal	4.77	4.84	2.15	4.84
LIFE_SKILLS_ASSM__C	Life Skills	3.36	3.44	3.08	4.26
MENTAL_HEALTH_ASSM__C	Mental Health	3.03	4.14	3.28	4.33
MOBILITY_ASSM__C	Mobility	3.19	3.25	2.33	4.19
PARENTING_SKILLS_ASSM__C	Parenting Skills	3.55	4.14	3.09	4.39
SAFETY_ASSM__C	Safety	3.33	4.29	3.47	4.61
SUBSTANCE_ABUSE_ASSM__C	Substance Abuse	4.94	4.95	3.82	4.95

Appendix O

Services Received by Families Who Completed the Program

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
0	Phone call	Family Coaching	7	36 of 129 (27.91%)	35
	In-person	Family Coaching	6		
	In-person	Housing services	3		
	Video conference	Family Coaching	3		
	Video conference	Higher Education	3		
	In-person	Employment navigation	2		
	Phone call	Employment navigation	2		
	Phone call	Housing services	2		
	In-person	Child services beyond childcare	1		
	In-person	Childcare	1		
	In-person	Higher Education	1		
	In-person	Mental health services	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
	Phone call	Family engagement	1		
	Phone call	Higher Education	1		
	Phone call	Mental health services	1		
1	Phone call	Family Coaching	10	46 of 211 (21.80%)	40
	In-person	Family Coaching	4		
	Phone call	Housing services	3		
	Video conference	Family Coaching	3		
	Phone call	Employment navigation	3		
	In-person	Housing services	2		
	In-person	Employment navigation	2		
	Phone call	Higher Education	2		
	Video conference	Housing services	1		
	Video conference	Higher Education	1		
	Video conference	Employment navigation	1		
	Phone call	Mental health services	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
	In-person	Childcare	1		
	Phone call	Family engagement	1		
	Phone call	Childcare	1		
	In-person	Legal aid	1		
	In-person	Higher Education	1		
	In-person	Family engagement	1		
	Video conference	Legal aid	1		
2	Phone call	Family Coaching	10	10 of 42 (23.81%)	41
	In-person	Family Coaching	8		
	Phone call	Employment navigation	6		
	Video conference	Family Coaching	5		
	Phone call	Housing services	4		
	In-person	Employment navigation	2		
	Phone call	Higher Education	2		
	In-person	Housing services	1		
	Phone call	Child services beyond	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
		childcare			
	Phone call	Childcare	1		
	Phone call	Mental health services	1		
3	Phone call	Family Coaching	7	71 of 177 (40.11%)	31
	In-person	Family Coaching	5		
	Video conference	Family Coaching	4		
	In-person	Employment navigation	2		
	In-person	Housing services	2		
	Phone call	Employment navigation	2		
	Phone call	Housing services	2		
	In-person	Childcare	1		
	In-person	Family engagement	1		
	In-person	Higher Education	1		
	In-person	Mental health services	1		
	Phone call	Childcare	1		
	Phone call	Higher Education	1		
	Phone call	Legal aid	1		

Services Received by Families Who Did Not Complete the Program

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
0	Video conference	Family Coaching	4	93 of 129 (72.09%)	35
	Phone call	Family Coaching	4		
	In-person	Family Coaching	3		
	Phone call	Employment navigation	2		
	Phone call	Higher Education	2		
	In-person	Employment navigation	2		
	In-person	Higher Education	2		
	In-person	Housing services	2		
	Phone call	Child services beyond childcare	2		
	Phone call	Housing services	2		
	Video conference	Higher Education	1		
	Phone call	Mental health services	1		
	Phone call	Legal aid	1		
	In-person	Child	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
		services beyond childcare			
	Phone call	Family engagement	1		
	In-person	Childcare	1		
	Phone call	Childcare	1		
	In-person	Youth services	1		
	In-person	Family engagement	1		
	Video conference	Housing services	1		
1	Phone call	Family Coaching	3	165 of 211 (78.20%)	23
	In-person	Family Coaching	2		
	In-person	Housing services	2		
	Phone call	Employment navigation	2		
	Phone call	Higher Education	2		
	Phone call	Housing services	2		
	Video conference	Family Coaching	2		
	In-person	Child services beyond childcare	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
	In-person	Childcare	1		
	In-person	Employment navigation	1		
	In-person	Family engagement	1		
	In-person	Legal aid	1		
	In-person	Mental health services	1		
	Phone call	Child services beyond childcare	1		
	Video conference	Higher Education	1		
2	Video conference	Family Coaching	6	32 of 42 (76.19%)	23
	In-person	Family Coaching	3		
	Phone call	Family Coaching	3		
	Phone call	Employment navigation	2		
	In-person	Child services beyond childcare	1		
	In-person	Employment navigation	1		
	In-person	Higher Education	1		
	In-person	Housing	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
		services			
	In-person	Mental health services	1		
	Phone call	Child services beyond childcare	1		
	Phone call	Family engagement	1		
	Phone call	Higher Education	1		
	Phone call	Housing services	1		
3	Phone call	Family Coaching	4	106 of 177 (59.89%)	22
	In-person	Family Coaching	2		
	Phone call	Employment navigation	2		
	Phone call	Housing services	2		
	Video conference	Family Coaching	2		
	In-person	Child services beyond childcare	1		
	In-person	Childcare	1		
	In-person	Employment navigation	1		
	In-person	Family	1		

Cluster	Delivery Format	Service Type	Count	Successful Families	Average Sessions
		engagement			
	In-person	Higher Education	1		
	In-person	Housing services	1		
	In-person	Mental health services	1		
	Phone call	Childcare	1		
	Phone call	Family engagement	1		
	Phone call	Higher Education	1		