

Performance Metrics Plan for the Montgomery County Department of Health and Human Services

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Project Goal

To enhance the documentation of the Montgomery County Department of Health and Human Services (DHHS) performance metrics into a more suitable format as well as create a data dictionary for future reference.

Project Description

DHHS found that they were inefficiently recording data used to create their necessary reports. With more than 130 direct service programs and contracted services from 700 different providers, the data from those services weren't always properly recorded. For example, data for some reports, such as the Monthly Trend Reports (MTRs), was recorded and tracked on both spreadsheets or paper reports. This variation causes inefficiency in creating reports; it took longer than necessary.

After learning about and examining the data contained in several DHHS reports, we realized one way to help DHHS employees correctly record information would be to provide them with a data dictionary. A data dictionary allows users to quickly find different service programs and attributes recorded throughout DHHS, including items such as variable name, variable description, data type, and more.

Furthermore, the data reports were all in a static formatting, meaning that the information could not be edited or updated. As a result, we decided to take all the data in those reports and import them into a database that could then be used to input, update, edit, or report information.

Background Information

Client Organization: Department of Health and Human Services

Primary Contact: Nouné Sekhpossian

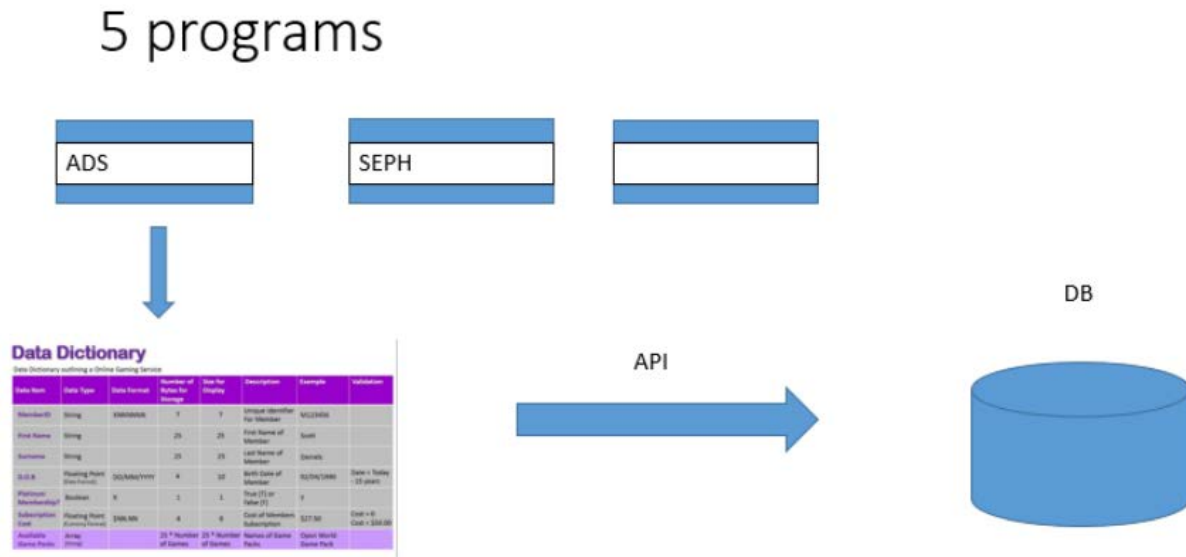
Email: Noune.Sekhpossian@montgomerycountymd.gov

Target Audience: DHHS employees, supervisors, and budgeting staff

Initially, the goal was to clean the monthly trend reports and organize them in three intervals: quarterly, monthly, and annually. First, a metadata schema was created to match the correct data types using a data dictionary to analyze and summarize data into the three intervals. Then, the data would be analyzed and summarizes for any patterns. Finally, each file type would be matched against the data dictionary for consistency. At the end of the process, the team would report results to the Performance Architecture and the UI/UX teams, respectively.

Current Context

As Illustration 1 shows, employees go on the website to get a monthly trend report (MTR), such as the number of patients per month from a particular department. However, the monthly trend report does not reliably display the desired or complete information.



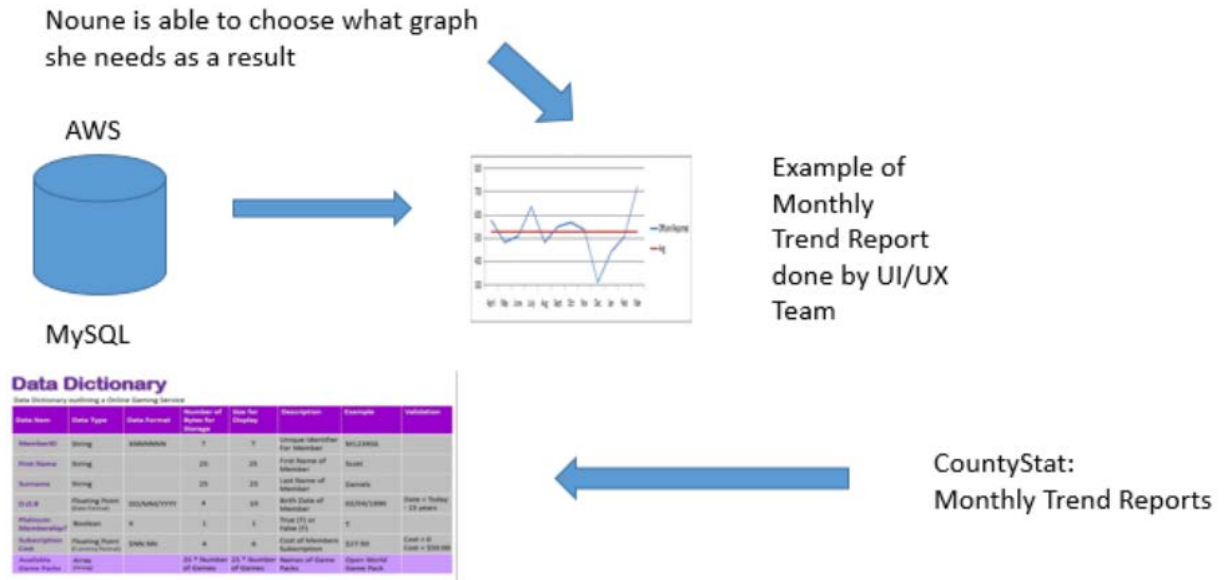
Behind the scenes, a metrics management team will clean the monthly trend reports to ensure the necessary metrics are included, and provide employees with the needed data in the monthly trend reports. This can potentially help in delegating resources, for example, nurses, to departments in need based on the number of their patients. This use case covers the capability to navigate through the data and filter metrics.

The second use case will put information from DHHS programs into a database to create a data dictionary that can then be imported as a database to Amazon Web Service cloud storage.* For this use case, a system administrator or other DHHS employee would have direct access to the database, where they can input or edit information. Other DHHS employees will have read-only access so the data cannot be changed or manipulated.

As a follow-up to our second use case, Illustration 2 displays a more overall example of how the total project between the three groups will work. The performance metrics team gathers data from CountyStat and converts it into a data dictionary/SQL database that a user could see in an

* Our student colleagues in INST490 who were assigned to the system architecture project determined that Amazon Web Service is the most suitable choice to meet the storage needs of DHHS.

Amazon Web Service cloud storage system and would be able to interact with the information using an interface created by the UI/UX team.



Project Outcomes

The team developed the two required capabilities:

- Navigating through a metadata schema to acquire necessary information about specific performance metrics.
- Enabling clients and employees to use performance metrics to monitor programs and budgets.

For example, to allow a manager to check that a program is within budget, we first obtained a DHHS spreadsheet of monthly trend reports and iterated a metadata schema to see what information should be stored in the data dictionary. We determined that the DHHS spreadsheet already had a metadata schema, which we maintained for the sake of simplicity. The monthly trend reports contained data from July 2017 to February 2018.

The second step was to extract the monthly trend reports from their specific programs and store their data to the data dictionary. After developing the data dictionary, we researched the best program to clean dirty data—Python or a third party program—because even though the content of the monthly trend reports was entered correctly, we had to assume inconsistency. For example, in the data element column, two entries were entered as decimals instead of percentages. We decided to use percentages due to how data was initially entered, using

openRefine, which can transform data into values that will make sense. Additionally, openRefine can turn data back to a .csv format that is useable by DHHS.

To clean the data, we used GREL commands, which converts data into specific types. For the data dictionary, we changed the date format to date/time, removing all of the NaNs, and turning the decimal into a percentage format. We worked with limited data, based on DHHS's decision that rather than sending a lot of data, it would be best to focus on one particular department, in this case, Public Health Services. This strategy helped meet the two required capabilities.

We also dealt with time constraints. The initial timeline called for completing the requirements by the end of April. Instead, the requirements were done by early May. During spring break, DHHS sent the data, which we could not review until early April. Despite the challenge, we completed the task in a timely manner. We also implemented the SQL table in a limited amount of time, completing it also in early May. Despite constraints, we were able to run queries and include all the tables from the data dictionary.

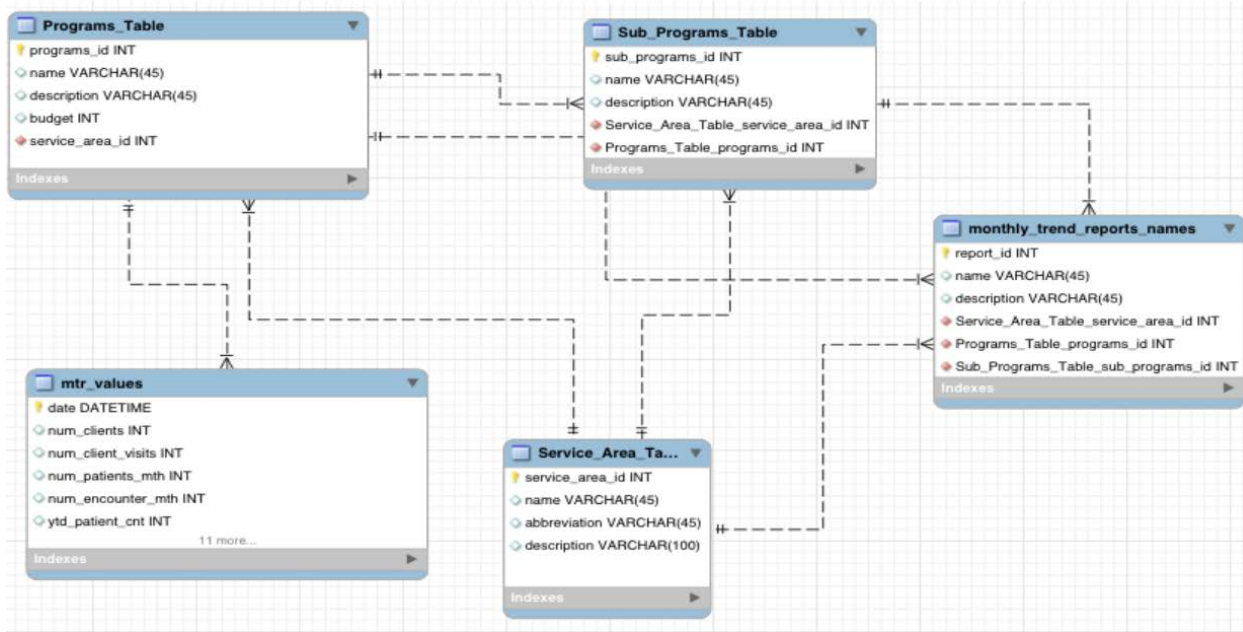
Deliverables, Testing, and Handoff Plan

DHHS received:

- A data dictionary with variable and content information for DHHS service areas and programs (see Appendix 1).
- An SQL table that will include all viable information from DHHS reports. This Entity Relationship Diagram (ERD) can be opened using MySQL Server Workbench (a separate database management application), but the ERD image is also included in this report.
- A written report on the process and details of the SQL table including information on the structure, layout, and decisions, to eliminate confusion that could occur after handoff. Also, the report will be a reference document for DHHS.

For the data dictionary, we will provide a detailed explanation of variable and content information for the service areas and programs. As of now, DHHS is reviewing the Google drive content, which will include the cleaned data dictionary and the first iterated data dictionary. The Entity Relational Diagram (ERD) featured below, shows the relationships between items in the DHHS system. For example, in the Public Health Services data, we can see one-to-many relationships in how the DHHS coordinates its services. This includes the ability to have one service area include several programs and one program to include several sub-programs.

The overall purpose of developing this ERD is to go through cleaned data and successfully write queries that gather the right material. In other words, the ERD and MySQL structures won't necessarily be used DHHS, but was a way to check cleaned data to ensure it makes sense.



Service Area Co	Program Code	Column	DATE	num_clients	num_client_visits	num_patients_mth	num_encounter_mth	ytd_patient_cnt	ytd_encounter	num_children	infant_risk_perc	num_infant_rsk	num_pregnant_teens	num_women_enrolled_maternity_partnership_program	num
1			2016-05-01T00:00:00Z	9909	784	4807	5897	22016	81625						
1			2016-06-01T00:00:00Z	9919	455	4701	5745	24100	87370						
1			2016-07-01T00:00:00Z	7023	18	4347	5181	4347	5181	33		21		10	152
1			2016-08-01T00:00:00Z	7337	98	4911	5627	7931	11108	133		14		10	147
1			2016-09-01T00:00:00Z	7708	784	4956	5941	10356	17049	126		7		16	140
1			2016-10-01T00:00:00Z	7643	803	4853	5705	13317	22945	44		10		16	137
1			2016-11-01T00:00:00Z	8044	1013	4821	5424	15088	28269	45		10		17	150
1			2016-12-01T00:00:00Z	8021	748	4233	4973	15576	33242	32		10		24	130
1			2017-01-01T00:00:00Z	8253	802	4918	5414	18251	38856	20		18		17	158
1			2017-02-01T00:00:00Z	8362	940	4865	5387	19880	44023	34		18		23	148
1			2017-03-01T00:00:00Z	8380	1125	5238	5415	21245	50440	27		14		17	178
1			2017-04-01T00:00:00Z	8605	596	4830	5865	22812	56341	78		10		14	125
1			2017-05-01T00:00:00Z	8134	913	5244	6575	24009	83585	39		11		21	157
1			2017-06-01T00:00:00Z	7593	808	5178	6388	25411	69071	29		10		21	129
1			2017-07-01T00:00:00Z	7339	42	4812	5732	4812	5732	41	83%	12		12	135
1			2017-08-01T00:00:00Z	7478	31	5205	6315	8885	12047	129	89%	15		17	125
1			2017-09-01T00:00:00Z	7785	772	4763	5956	11268	17643	165	93%	14		19	129
1			2017-10-01T00:00:00Z	8200	1084	5156	6227	13814	23870	58	93%	13		20	149
1			2017-11-01T00:00:00Z	8544	1109	4918	5889	15724	29739	58	89%	15		12	111
1			2017-12-01T00:00:00Z	8305	765	4397	5181	17205	34000	21	100%	16		13	99
1			2018-01-01T00:00:00Z	8388	701	4887	5811	18831	40711	30	100%	18		14	149
1			2018-02-01T00:00:00Z	8527	896	4963	6508	20227	48219	24	100%	22		24	148

The diagram and spreadsheet show the data dictionary cleaned through openRefine. The date format was changed to Date/Time for easy access. The decimal percentage was changed into whole numbers for consistency. Any N/As were removed though GREL, which transforms the existing data by replacing it with the new data.

Conclusion

The team cleaned and organized data to make it presentable to DHHS.

Even though we were successful, there are additional steps we would implement in the future. For example, a user could filter the dataset to go deeper into a program/contract and find contact information about the heads of programs. Due to time constraints, we were not able to filter the dataset further and find program head contact information. In the future, we would make a column in another table for that content.

Additionally, to ensure the data dictionary works as needed, we would test it against other departments. For example, we would cross-check data from the Public Health Services with data from the Department from Aging and Disabilities, to see if any changes are necessary. We could also make a specific data dictionary for other departments.

Appendix 1:

Montgomery County Department of Health and Human Services Data Dictionary

DHHS collects numerous metrics for its more than 130 direct service programs and contracted services with 700 providers. Metrics are reported in DHHS Monthly Trend Reports (MTR), annually via the Office of Management and Budget (OMB), or via initiatives such as CountyStat and dataMontgomery. Data are typically tracked in spreadsheets or in paper reports, and are not consolidated or analyzed, except on an ad hoc basis. DHHS currently has no central standardized management system for its program performance data.

To fix the inefficiency in their reports, help DHHS employees correctly record information is to we created a data dictionary that allows users to quickly find different service programs and their recorded attributes such as variable name, variable description, data type, and more.

Furthermore, the data reports were all in a static formatting, meaning can't be edited or updated. All of the data in those reports were imported into a database that could be used to effectively input, update, edit, or report information.

The data dictionary included data information that we could address in a limited timeframe. As DHHS has a large amount of data, report types, and records, we focused on the Public Health Services and Services to End and Prevent Homelessness. The data dictionary includes data descriptions for variables such as number of clients enrolled, number of patients per month, number of visits per month, and the infant risk percentage.

Service Area: Public Health Services (PHS)

Program: Health Care for the Uninsured

1. perc_child_prim_care_visit
 - a. Percent of vulnerable populations that have a primary care visit - Children
2. perc_adults_prim_care_visit
 - a. Percent of vulnerable populations that have a primary care visit – adult

Sub-Programs: Montgomery Cares

1. num_patients_mth (INT)
 - a. Number of patients for the month
2. num_encounter_mth (INT)
 - a. Number of encounters for the month (unreconciled)
3. ytd_patient_cnt (INT)

a. YTD patient count (unduplicated)

4. ytd_encounter (INT)

Sub-Program: Maternity Partnership Program

1. num_children (INT)

a. Number of children, ages 0-18, Immunized by the Area Health Centers

2. infant_risk_perc (%)

a. Percentage of Infant at Risk referrals that receive a contact by the area health center staff within 10 days

3. num_infants_risk (INT)

a. Number of infants at risk referred to the area health centers for nurse case management services

4. num_pregnant_teens (INT)

a. Number of pregnant teens (under age 20) referred for nurse case management services at the area health centers

5. num_women_enrolled_maternity_partnership_program (INT)

a. Number women enrolled in the Maternity Partnership program

Sub-Program: Care for Kids

Sub-Program: Healthcare for the Homeless

Program: Communicable Disease and Epidemiology

1. perc_investigations_diseases (%)

a. Percent of investigations on reportable communicable diseases that follow appropriate protocols to limit further spread of the disease

Program: Health Care and Group Residential Facilities

1. perc_nursing_homes_w_def (%)

a. Percent of nursing homes with actual harm deficiencies

Program: Public Health Emergency Preparedness & Response

1. perc_phs_w_coop_plans (%)

a. Percent of Public Health Services (PHS) programs with Continuity of Operations (COOP) plans that have been reviewed and updated within the past 12 months

Program: Tuberculosis Services

1. perc_w_tuberculosis (%)

a. Percent of clients with active infectious tuberculosis that receive and are scheduled to complete Directly Observed Therapy and successfully complete the treatment regimen Program: Community Health Services

1. perc_iar_referrals_10days_followup (%)

a. Percent of Infants At Risk (IAR) referrals that received a follow-up visit within 10 days by Community Health Service (CHS) nurse

2. num_children_immunized (INT)

a. Number of children, ages 0-18, Immunized by Area Health Centers

3. perc_iar_referrals_10days_contact (%)

a. Percent of Infants at Risk referrals that receive a contact by Area Health Center staff within 10 days.

4. num_iar_referred_area_health_centers (INT)

a. Number of Infants at Risk referred to the Area Health Centers for Nurse Case Management Services

5. num_pregnant_teens_referred_for_nurse_case_mgmt

a. Number of Pregnant Teens (under age 20) Referred for Nurse Case Management Services at the Area Health Centers

Program: Dental Services

1. perc_children_comp_dental_plan

a. Dental Services - Percentage of children that complete their dental treatment plan

Program: Environmental Health Regulatory Services

1. perc_swimming_pools_under_compliance

a. Percent of swimming pools found to be in compliance upon regular inspection

Program: School Health Services

1. perc_students_ret_to_class

a. Percent of students that return to class and are ready to learn after a health room visit

Sub-Program: School Based Health Centers

1. tot_num_clients_enrolled

a. Total number of clients enrolled (cumulative for the school year)

2. tot_num_client_visits

a. Total number of client visits

Service Area: Services to End and Prevent Homelessness (SEPH)

Program: Permanent Supportive Housing Services

1. perc_hh_rem_housed_12mths
 - a. Percent of households remaining housed at least 12 months after placement in permanent supportive housing Program: Rental & Energy Assistance Program
1. avg_num_rec_rental_subsidy_mthly
 - a. Average number of households receiving a rental subsidy each month

Program: Shelter Services

1. avg_length_of_stay_by_homeless_fam
 - a. Average length of stay by homeless families in emergency shelter

Sub-Program: Motel Overflow

1. num_families_served_motel
 - a. Number of families served in motel overflow who are also involved in DHHS domestic violence programs (APP/VASAP)
2. other_fam_served_motel
 - a. All other families served in motel overflow
3. tot_fam_served
 - a. Total number of families served in motel overflow

Sub-Program: Family Shelters

1. num_families_entering_shelters
 - a. Number of families entering family shelters
2. num_families_exiting_shelters
 - a. Number of families exiting family shelters
3. tot_families_served
 - a. Total families served in family shelters
4. avg_los_family_members
 - a. Average LOS for family members exiting family shelters (days)
5. num_on_waiting_list
 - a. Number of families on shelter waiting list
6. num_single_homeless_adults_served
 - a. Number of single homeless adults served

Program: Emergency Services

1. motel_expenditures
 - a. Emergency Services – motel expenditures
2. motel_nights

- a. Emergency Services – motel nights
- 3. hh_es_grants
 - a. Households receiving ES grants to prevent eviction/homelessness

Glossary

The Montgomery County Department of Health and Human Services has several service areas, programs, and sub-programs within it. This section provides a clearer understanding of the service areas, programs, and sub-program responsibilities within the DHHS system.

Service Areas:

1. Public Health Services (PHS)
2. Services to End and Prevent Homelessness (SEPH)

Programs

1. Communicable Disease and Epidemiology
2. Health Care and Group Residential Facilities
3. Public Health Emergency Preparedness & Response
4. Tuberculosis Services
5. Health Care for the Uninsured
6. Community Health Services
7. Dental Services
8. Environmental Health Regulatory Services
9. School Health Services
10. Permanent Supportive Housing Services
11. Rental & Energy Assistance Program
12. Shelter Services
13. Emergency Services

Sub-Programs:

1. Montgomery Cares
2. Care for Kids
3. Maternity Partnership
4. Healthcare for the Homeless
5. School Based Health Centers
6. Motel Overflow
7. Family Shelters

Metric Types:

1. Input

2. Output
3. Outcome
4. Quality
5. Efficiency

Units of Measure:

1. Integers
2. Percentage
3. Rate (expressed as decimals)
4. Dollars