STATE OF MICHIGAN
DEPARTMENT OF HEALTH AND HUMAN SERVICES
LANSING

GRETCHEN WHITMER
GOVERNOR

ELIZABETH HERTEL
DIRECTOR

June 1, 2022

Keri Toback
Division of Program Operations – East Branch
Medicaid & CHIP Operations Group
Centers for Medicare & Medicaid Services
233 North Michigan Avenue, Suite 600
Chicago, Illinois 60601-5519

Dear Ms. Toback,

Re: Project Number 11-W-00302/5 – Flint Michigan Section 1115 Demonstration

Enclosed is the quarterly report for the Flint Michigan Section 1115 Demonstration. It covers the second quarter of demonstration year 6. The report provides operational information, program enrollment, and policy changes related to the waiver as specified in the Special Terms and Conditions.

Should you have any questions related to the information contained in this report, please contact Jacqueline Coleman. She may be reached by e-mail at colemanj@michigan.gov.

Sincerely,

[redacted]

Keith White, Director
Actuarial Division

cc: Angela Garner
Nicole McKnight

Enclosure (8)

Flint Michigan Section 1115 Demonstration
Quarterly Report

Demonstration Year: 6 (09/15/2021 – 09/30/2022)
Quarter: 2 (01/01/2022 – 03/31/2021)

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Introduction

On March 3, 2016, the Centers for Medicare and Medicaid Services (CMS) approved the Michigan Department of Health and Human Services' (MDHHS) application to expand Medicaid coverage for individuals impacted by lead exposure in the Flint water system through February 28, 2021. Through the demonstration, entitled "Flint Michigan Section 1115 Demonstration" and the associated state plan amendments, State Medicaid eligibility expanded to low-income children and pregnant women who were served by the Flint water system during a specified period of time and who would not otherwise be eligible for Medicaid. This population consists of children in households with incomes from 212 percent of the federal poverty level (FPL) up to and including 400 percent of the FPL and pregnant women in households with incomes from 195 percent up to and including 400 percent of the FPL.

The demonstration population receives care primarily through Medicaid managed care plans and receives all state plan benefits including, for children, Early and Periodic Screening, Diagnostic and Treatment (EPSDT). Individuals receiving benefits under the demonstration are exempt from cost sharing and premiums. Targeted Case Management and home lead investigation services are available to children and pregnant women served by the Flint water system during the defined period who have been determined eligible for Medicaid. The provision of specialized services is limited to certain providers as allowable under the approved demonstration.

Enrollment and Benefits Information

Enrollment into the Flint Medicaid waiver program began May 9, 2016. Beneficiaries already eligible for Medicaid were contacted by mail with information on expanded services provided by the waiver. Potential enrollees can apply for the program via the MDHHS website, by calling a toll-free number or by visiting any MDHHS County office or an area navigator site. Healthcare coverage and application information for people impacted by the Flint water system can be found on the MDHHS website.[1]

Demonstration enrollment activity is detailed in this section of the report. For reporting purposes, the Children enrollment group is defined as demonstration enrollees under the age of 21. Pregnant women are identified using pregnancy indicators in the MDHHS data warehouse. To avoid duplication, pregnant women are excluded from the Children enrollment group. The following table shows enrollment in the demonstration by month.

Table 1: Flint Demonstration Enrollment by Month

Enrollment Group	January 2022	February 2022	March 2022
Pregnant Women	367	348	361
Children	25,636	25,317	25,595
Total	26,003	25,665	25,956

[1] http://www.michigan.gov/mdhhs/0,5885,7-339-71547-384168--,00.html

Table 2 displays Flint demonstration new enrollment by month. This includes individuals who may have previously been enrolled in other Medicaid programs but are new to the Flint demonstration.

Table 2: Flint Demonstration New Enrollment by Month				
Enrollment Group	January 2022	February 2022	March 2022	Total
Pregnant Women	35	18	37	90
Children	95	89	82	266
Total	130	107	119	356

Table 3 shows Flint demonstration re-enrollments by month. Re-enrollments include individuals who have disenrolled and re-enrolled in the Flint demonstration. Individuals under the re-enrollment category also include individuals that may have previously been enrolled in other Medicaid programs.

Table 3: Flint Demonstration Re-Enrollment by Month				
Enrollment Group	January 2022	February 2022	March 2022	Total
Pregnant Women	25	30	28	83
Children	79	77	78	234
Total	104	107	106	317

Table 4 contains Flint demonstration disenrollment by month. Disenrollment for a reporting month contains individuals with program enrollment in the prior reporting month that do not have program enrollment for the current reporting month. For example, individuals defined as disenrolled in February 2022 were enrolled in the demonstration in January 2022 but were not enrolled in February 2022. Demonstration disenrollment is often the result of failure to timely return redetermination paperwork and transferring to another Medicaid program.

Table 4: Flint Demonstration Disenrollment by Month				
Enrollment Group	January 2022	February 2022	March 2022	Total
Pregnant Women	48	49	52	149
Children	202	485	203	890
Total	250	534	255	1,039

Additional demonstration disenrollment reports by month have been included as attachments. Enrollment maps depicting the geographic distribution of demonstration enrollees for the quarter have also been included as attachments to this report. The attached reports will not necessarily align numerically with the figures reported in the quarterly report tables due to differences in the timing of data retrieval and specifications.

MDHHS monitors the Flint demonstration population's usage of Medicaid benefits to assure access to care. The following access to care metrics utilizes the same enrollment group definitions for children and pregnant women as described for tables 1 – 3. It should be noted that the Children Under 6 category below is a subgroup of the Children category.

The following table lists the cumulative, unduplicated count of Flint demonstration enrollees since the waiver begin date of May 9, 2016 through the end of the reporting quarter, March 31,

2022. The table displays the total number of those enrolled with a visit to a provider with a primary care associated specialty. This includes practitioners with a specialty of family medicine, general medicine, internal medicine, or pediatrics. This metric includes any procedure rendered by a primary care provider (PCP).

Table 5: Cumulative Flint Demonstration PCP Utilization May 2016 – March 2022			
Enrollment Group	Cumulative Enrollment	Cumulative Count of Enrollees with PCP Visit(s)	Cumulative Percentage of Enrollees with PCP Visit(s)
Children	42,366	39,514	93%
Children Under 6	17,444	16,898	97%
Pregnant Women	5,022	4,789	95%
Total	47,388	44,303	93%

Table 6 indicates the monthly count of PCP visits for the reporting quarter's Flint demonstration population.

Table 6: Monthly Flint Demonstration PCP Visits				
Enrollment Group	January 2022	February 2022	March 2022	Total
Children	6,541	5,001	6,841	18,383
Pregnant Women	169	90	129	388
Total	6,710	5,091	6,970	18,771

Targeted Case Management services are provided by Genesee Health System and include the following assistance:

- Comprehensive assessment and periodic reassessment of individual needs;
- Development of a specific care plan;
- Referrals and related activities to help obtain needed services;
- Monitoring and follow-up activities.

The following table includes Targeted Case Management service activity as provided by Genesee Health System. Individuals counted as those with ongoing services are defined as individuals receiving a Targeted Case Management-related service other than assessment during the month, including unbilled face-to-face and phone contacts.

Table 7: Genesee Health System Targeted Case Management Activity		
Month	Count of Assessments	Count of Enrollees with Ongoing Targeted Case Management
January 2022	2	45
February 2022	0	50
March 2022	1	58
Cumulative Total	824	1,207

Outreach/Innovation Activities to Assure Access

MDHHS and community partners work together to coordinate and implement outreach for those affected by the Flint water system. Activities have included press conferences, public service announcements, community events, advertisements on radio and television, social media posts, and letters to providers and potential enrollees. The public can access waiver specific information, including weekly enrollment reports, on the department's website.[2] A variety of expenditure data and resources for Flint families are available on the State's Flint water website.[3] MDHHS has prominently displayed the link to the Flint water website on the MDHHS homepage.[4]

Operational and Policy Development

MDHHS regularly meets with Medicaid Health Plans and provider groups to address operational issues, programmatic issues, and policy updates and clarifications. Additionally, MDHHS provides updates to the Medical Care Advisory Council (MCAC) at regularly scheduled quarterly meetings. Enrollment in the Flint demonstration remains stable and the demonstration population continues to consistently access services.

Budget Neutrality Monitoring

According to the demonstration special terms and conditions, MDHHS is required to report demonstration expenditures subject to budget neutrality. In this demonstration, this is limited to all demonstration medical assistance expenditures for lead investigation with dates of services within the demonstration's approval period. The following budget neutrality table includes expenditures for March 2016 – December 2016.

Table 8: Flint Demonstration Budget Neutrality Monitoring

	DY 1 - PMPM	DY 2 - PMPM	DY 3 - PMPM	DY 4 - PMPM	DY 5 - PMPM
Approved Flint Lead Diagnostics PMPM	$ 10.49	$ 10.49	$ 10.49	$ 10.49	$ 10.49
Actual Flint Lead Diagnostics PMPM (YTD)	$ 0.18	-	-	-	-
Total Flint Lead Diagnostics Expenditures (YTD)	$ 29,940.00	-	-	-	-
Total Flint Demonstration Member Months (YTD)	168,304	-	-	-	-

As of January 1, 2017, Michigan's approved Children's Health Insurance Program (CHIP) Health Services Initiative (HSI) provides funding for lead abatement in the impacted areas of Flint, Michigan. As a result, expenditures subject to budget neutrality in the Flint Demonstration are limited to calendar year 2016. Lead abatement expenditures after 2016, including those

[2] http://www.michigan.gov/mdhhs/0,5885,7-339-71547-376862--,00.html
[3] http://www.michigan.gov/flintwater
[4] http://www.michigan.gov/mdhhs/

associated with environmental diagnostic testing, are reported per CHIP HSI regulatory requirements.

Consumer Issues

MDHHS utilizes the Beneficiary Helpline as a central point of contact for members to ask questions, report complaints and resolve issues. Information on beneficiary complaints and health plan grievances and appeals are currently collected for other Medicaid programs. In the following table, MDHHS has refined existing reporting mechanisms to measure Flint demonstration member telephone contacts with the department.

Table 9: Flint Demonstration Customer Service Requests January 2022 – March 2022	
Category	Number of Contacts
Obtaining Prescription	3
COVID Medicaid Reopen	3
1095B Form	2
Total	8

Demonstration Evaluation

MDHHS has commissioned the Michigan State University Institute for Health Policy (MSU-IHP) to serve as the Flint demonstration independent evaluator. MSU-IHP will conduct demonstration evaluation activities in four domains over a four-year evaluation period. The four domains are as follows:

I. Access to Services
II. Access to Targeted Case Management
III. Improved Health Outcomes
IV. Lead Hazard Investigation

This quarter's administrative activities included ongoing workgroup meetings to monitor activities and produce deliverables. MSU-IHP continues to meet with MDHHS to discuss project progress. Additionally, MSU-IHP discussed with CMS the Waiver Renewal Evaluation Plan and incorporated recommended changes. This quarter, MSU-IHP submitted a Renewal Evaluation Proposal and the 2021 Annual Report. The MSU-IHP Annual Report has been included as an attachment to this quarterly report. Additionally, activities included enrollee Survey Wave IV data collection and management. MSU-IHP met MSU College of Education to identify educational and developmental data for child enrollees.

Domain I: Access to Services

Domain I will examine the hypothesis that demonstration enrollees will access services to identify and address physical or behavioral health issues associated with lead exposure at a rate higher than others with similar levels of lead exposure. This quarter, all relevant Domain 1

survey data through Wave 3 was merged and harmonized with administrative data. Administrative data sets through 4/30/21 were incorporated into the 2021 Annual Report.

Domain II: Access to Targeted Case Management

Domain II will assess if demonstration enrollees who access Targeted Case Management services will access needed medical, social, educational, and other services at a rate higher than others with similar levels of lead exposure. This quarter, all relevant Domain 2 survey data through Wave 3 was merged and harmonized with administrative data. Administrative data sets through 4/30/21 were incorporated into 2021 Annual Report. Wave 3 Key Informant Interview data was coded and analyzed for inclusion into the 2021 Annual Report.

Domain III: Improved Health Outcomes

Domain III will evaluate the hypothesis that demonstration enrollees will have improved health outcomes compared to others with similar levels of lead exposure. This quarter, all relevant Domain 3 survey data through Wave 3 was merged and harmonized with administrative data. Administrative data sets through 4/30/21were incorporated into the 2021 Annual Report.

Domain IV: Lead Hazard Investigation

Domain IV will examine if the lead hazard investigation program reduces estimated expected ongoing or re-exposure to lead hazards in the absence of this program. This quarter, all relevant Domain 4 survey data through Wave 3 was merged into existing longitudinal survey data set. MSU-IHP will utilize Flint Registry and Flint Lead Free reporting to support this domain.

Enclosures/Attachments

1. January 2022 Flint Demonstration Disenrollment Report (CM-100)
2. February 2022 Flint Demonstration Disenrollment Report (CM-100)
3. March 2022 Flint Demonstration Disenrollment Report (CM-100)
4. Quarterly Geographic Distribution Enrollment Map: Pregnant Women
5. Quarterly Geographic Distribution Enrollment Map: Children
6. Quarterly Geographic Distribution Enrollment Map: Children Under 6
7. Michigan State University Institute for Health Policy 2018-2021 Cumulative Evaluation Report

State Contacts

If there are any questions about the contents of this report, please contact one of the following people listed below.

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Actuarial Division

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Lansing, MI 48909-7979

Fax: (517) 241-5112

Date Submitted to CMS

June 1, 2022

State of Michigan
Department of Health and Human Services
Medicaid Waiver Monthly CMS report

Report ID: CM-100
Report Period: 01/01/2022

Run Date: 05/05/2022
Run Time: 8:44:38AM

1. Monthly count of disenrollment because of transfer to another eligibility group: 137

2. Monthly count of disenrollment other than transfer to another Medicaid group: 32

3. Monthly count of beneficiaries due for renewal: 831

4. Number of beneficiaries due for renewal who did not renew: 831

5. Number of beneficiaries due for renewal who lost eligibility: 1

6. Enrollment continuity in weeks for all individuals enrolled during the reporting month:

05/07/2016	Thru	12/31/2021	Count:	74,770
01/01/2022	Thru	01/01/2022	Count:	85
01/02/2022	Thru	01/08/2022	Count:	30
01/09/2022	Thru	01/15/2022	Count:	34
01/16/2022	Thru	01/22/2022	Count:	42
01/23/2022	Thru	01/29/2022	Count:	36
01/30/2022	Thru	01/31/2022	Count:	30

********** END OF THE REPORT **********

State of Michigan
Department of Health and Human Services
Medicaid Waiver Monthly CMS report

Report ID: CM-100
Report Period: 02/01/2022

Run Date: 05/05/2022
Run Time: 8:58:06AM

1. Monthly count of disenrollment because of transfer to another eligibility group: 132

2. Monthly count of disenrollment other than transfer to another Medicaid group: 39

3. Monthly count of beneficiaries due for renewal: 788

4. Number of beneficiaries due for renewal who did not renew: 788

5. Number of beneficiaries due for renewal who lost eligibility: 2

6. Enrollment continuity in weeks for all individuals enrolled during the reporting month:

05/07/2016	Thru	01/31/2022	Count:	75,027
02/01/2022	Thru	02/05/2022	Count:	89
02/06/2022	Thru	02/12/2022	Count:	24
02/13/2022	Thru	02/19/2022	Count:	39
02/20/2022	Thru	02/26/2022	Count:	37
02/27/2022	Thru	02/28/2022	Count:	18

********** END OF THE REPORT **********

State of Michigan
Department of Health and Human Services
Medicaid Waiver Monthly CMS report

Report ID: CM-100
Report Period: 03/01/2022

Run Date: 05/05/2022
Run Time: 9:02:37AM

1. Monthly count of disenrollment because of transfer to another eligibility group: 101

2. Monthly count of disenrollment other than transfer to another Medicaid group: 72

3. Monthly count of beneficiaries due for renewal: 901

4. Number of beneficiaries due for renewal who did not renew: 899

5. Number of beneficiaries due for renewal who lost eligibility: 0

6. Enrollment continuity in weeks for all individuals enrolled during the reporting month:

05/07/2016	Thru	02/28/2022	Count:	75,234
03/01/2022	Thru	03/05/2022	Count:	97
03/06/2022	Thru	03/12/2022	Count:	35
03/13/2022	Thru	03/19/2022	Count:	34
03/20/2022	Thru	03/26/2022	Count:	17
03/27/2022	Thru	03/31/2022	Count:	23

********** END OF THE REPORT **********

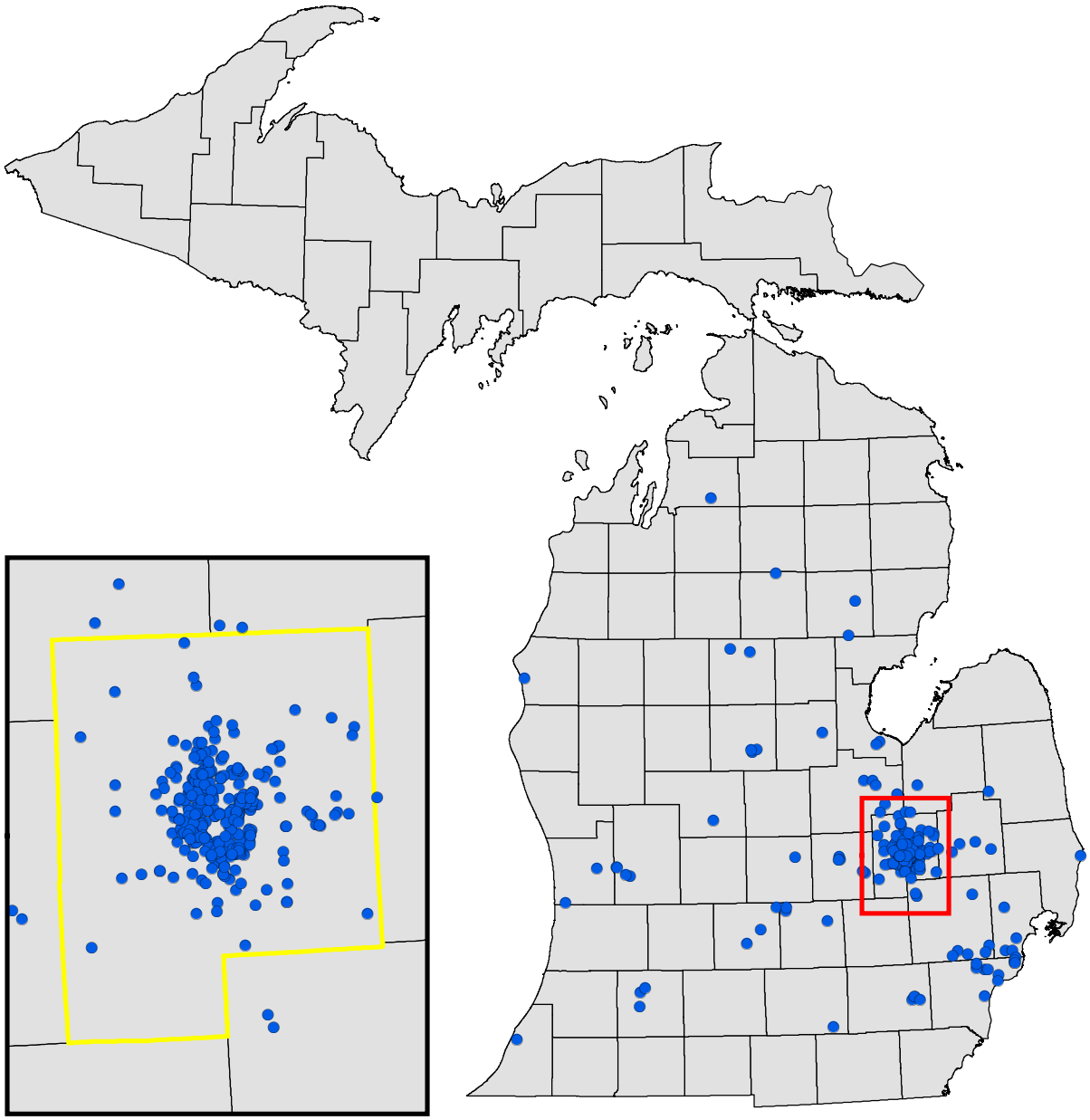
Flint Demonstration Waiver Enrollees

Pregnant

January - March 2022

Genesee: 358

All Other Counties: 90



Source: MDHHS Data Warehouse
Retrieved on May 17, 2022

MDHHS - Actuarial Division
May 17, 2022

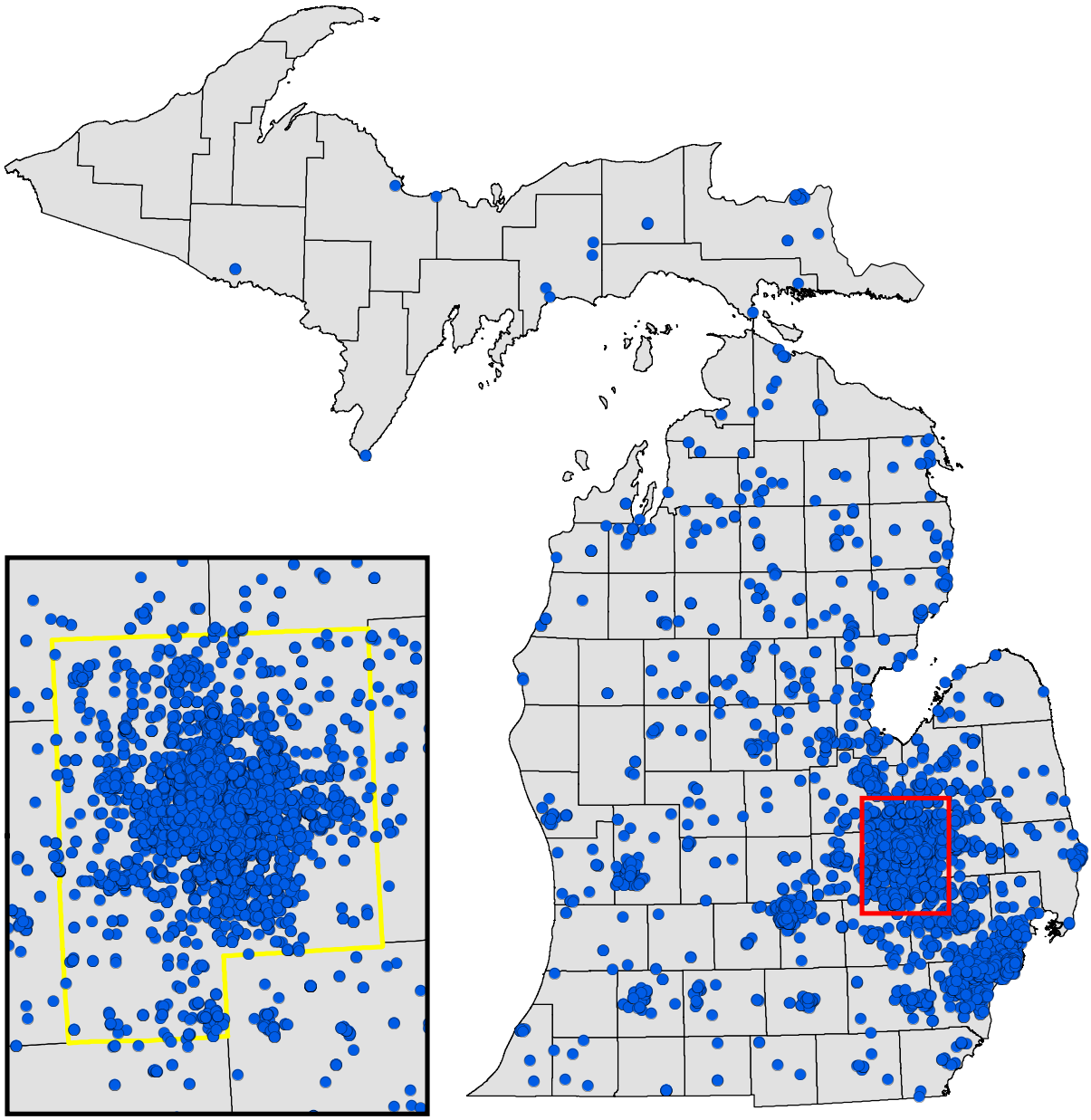
Flint Demonstration Waiver Enrollees

0-20 Years Old

January - March 2022

Genesee: 21,994

All Other Counties: 3,389



Source: MDHHS Data Warehouse
Retrieved on May 17, 2022

MDHHS - Actuarial Division
May 17, 2022

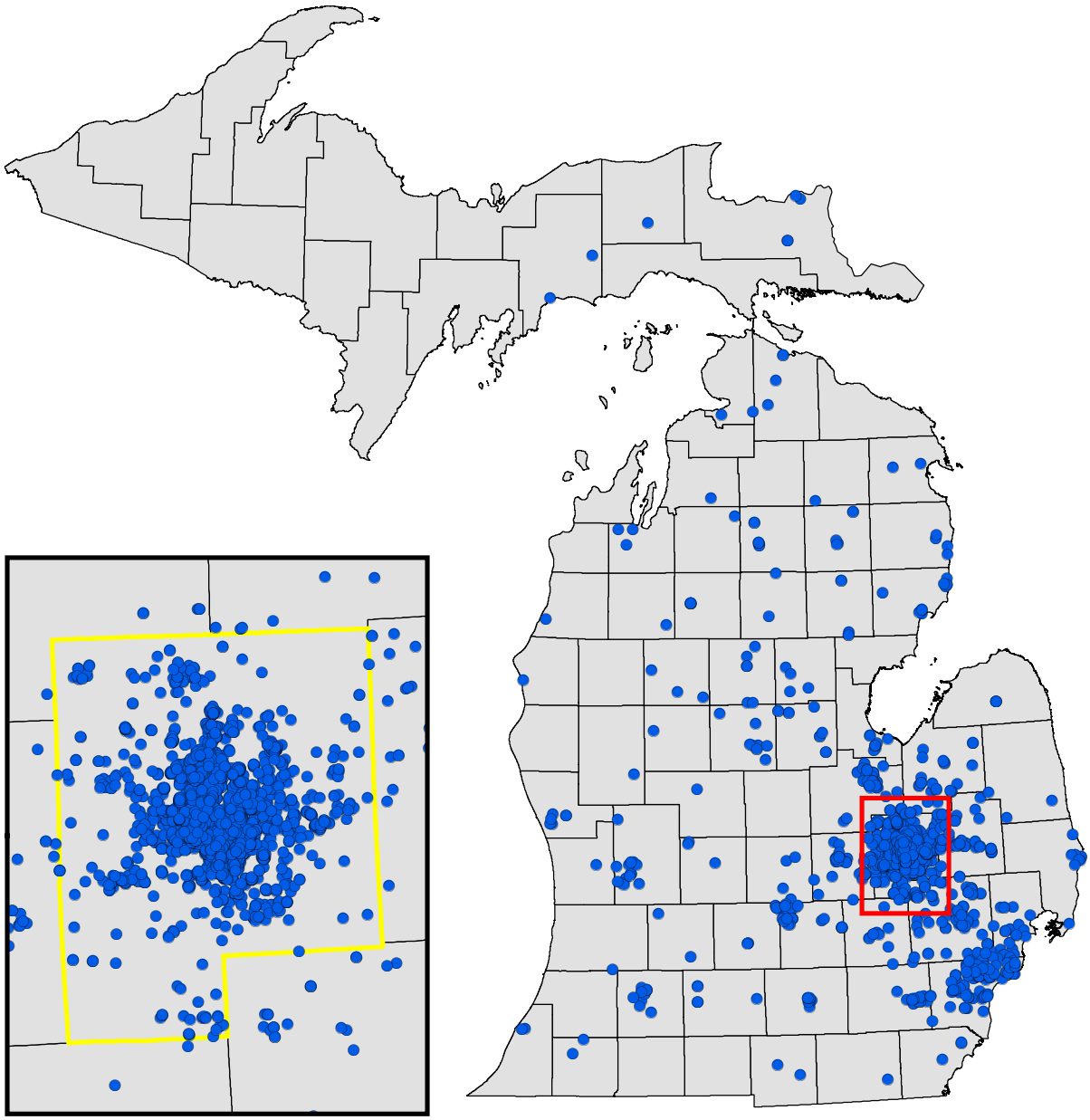
Flint Demonstration Waiver Enrollees

0-5 Years Old

January- March 2022

Genesee: 4,189

All Other Counties: 715



Source: MDHHS Data Warehouse
Retrieved on May 17, 2022

MDHHS - Actuarial Division
May 17, 2022

Flint, Michigan Section 1115 Demonstration

#11W 00302/5

2018-2021 Cumulative Evaluation Report

Submitted 3/31/22

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Executive Summary

In April 2014, Flint, Michigan experienced a public health crisis related to its water supply. The City of Flint switched the water source, from Lake Huron and Detroit River to the Flint River, to reduce costs. This switch, and its water treatment process, caused lead and other toxins to leach from pipes that delivered water into homes. As a result, many residents experienced serious health problems particularly from drinking the water. Chief among them was lead exposure in pregnant women and children. Health providers discovered the incidence of elevated blood lead levels (EBLL) in Flint children increased significantly from 2.4% to 4.9% after the water source change.[1] Those neighborhoods with aging lead pipes and infrastructure experienced a 6% increase in lead levels in the drinking water.[2]

Lead is a neurotoxin and EBLL can affect the developing brain and neural systems. Lead exposure in utero and in young children has the potential to cause serious physical and developmental delays. These neurodevelopmental effects can impact intelligence, behavior, and a healthy life trajectory. In unborn children, lead crosses the placenta as a toxin and may cause miscarriage, low-birth weight, and affect major organs. These effects are difficult to ameliorate and are often sustained into adulthood.

In 2016, the federal government declared the Flint Water Crisis an emergency and leveraged funds to assist residents facing immediate effects of the contaminated water. To address the sustained public health crisis directly, the Centers for Medicare and Medicaid Services (CMS) administered funds via the Michigan Department of Health and Human Services (MDHHS) to expand eligibility and access to healthcare for children under 21 years of age and pregnant women. The Flint Medicaid Expansion (FME) was approved March 3, 2016, and enrollment commenced on May 9, 2016, approximately two years after the water switch date of April 25, 2014. This Medicaid Section 1115 Waiver expands eligibility and services in two ways: 1) increases the income eligibility from a maximum of 212% FPL to 400% FPL, and 2) includes Targeted Case Management of specialized services.

MDHHS engaged Michigan State University's Institute for Health Policy (IHP) to evaluate the expansion of Medicaid services in four domains: 1) Access to Care; 2) Access to Targeted Case Management (TCM); 3) Improved Health Outcomes; and 4) Lead Hazard Investigation. The four domains offer specific hypotheses to guide the evaluation. The evaluation plan was approved by CMS August 8, 2017, and the contract between IHP and MDHHS authorizing the work was effective January 2018. In this report, evaluation activities completed from 1/1/2018 through 12/31/21 are described.

The anchor point selected for evaluation activities was May 1, 2016, to coincide with the initial waiver enrollment date of May 9, 2016. Given the two-year gap between the water switch and waiver enrollment, three timeframes are considered:

Table 1: Evaluation Timeframe Reference

Timeframe Code	Timeframe Description
T1	Baseline year prior to the water switch (**May 1, 2013 – April 30, 2014**).
T2	Post water switch, FME not implemented (**May 1, 2014 – April 30, 2016**).
T3	Post water switch, FME implemented (**May 1, 2016 – present**).

The timeframes codes and corresponding color coding are utilized throughout the report to give context to data and activities. Predominant evaluation activities carried out during calendar year 2018 included acquisition of data, data preparation, securing resources to implement the evaluation, engaging key stakeholders, and preliminary analyses. Activities during calendar year 2019 included expansion of available results as well as implementation of enrollee and TCM provider surveys. Evaluation work during calendar year 2020 was affected by the coronavirus pandemic and associated government stay-home orders.

The coronavirus pandemic continued to affect evaluation activities during calendar year 2021. The team noted significant variation in the data extracted from the state's data warehouse for the timeframe 5/1/20 – 4/31/21. Fewer claims/encounters, lab test results, and live birth data were identified. Data was repulled several times without change. Investigation continues with state partners to determine if there may be systematic issues affecting data quality. Available evidence suggests that the observed decreases are likely due to the state's shut-down. Due to outstanding questions regarding data quality the results presented in this report are preliminary. Statistical testing is not presented for measures where it would be inappropriate to do so without further validation.

However, opportunities arose as well during the 2021 evaluation period. Particularly, the waiver extension offered an opportunity to obtain an additional wave of survey data from enrollees and TCM Providers. The waiver was originally scheduled to end February 2021. A one-year temporary extension through February 2022 was granted to MDHHS by CMS while CMS reviewed the state's waiver renewal application. Thus, the final evaluation report submission date has been moved from the original April 2021 date to an October 2022 submission date. This extension will allow for the inclusion of claims/encounter data for services provided through 4/30/22.

Evaluation activities through December 2021 indicate the FME Waiver has had improvements, particularly for children, in meeting the overarching goal to identify and address any physical or

behavioral health issues associated with actual or potential exposure to lead hazards. Specific analytic methods for the sub-hypotheses vary by measure. Key findings are presented in each of the four Domains. A summary table is in Appendix 7.

The revised hypothesis for **Domain 1**, Access to Care, states *"Enrollees will access services to identify and address physical or behavioral health issues associated with lead exposure at a rate higher than non-enrollees with similar individual and neighborhood characteristics"* (herein referred to as Comparison Group). Statistical analyses based on tests comparing the difference in trends from T1 through T3 between the FME group and the Comparison Group document statistically significant differences. FME generally outperforms the Comparison Group. There remain specific opportunities for FME to improve outcomes involving post-partum care and identifying reasons adult enrollees express more difficulty accessing care since enrollment.

Limited impact is documented in **Domain 2,** Access to TCM, which is thought to be related to low TCM uptake and participation. The hypothesis for this domain states "*Enrollees who access TCM services will access needed medical, social, educational, and other services at a rate higher than enrollees with similar individual and neighborhood characteristics but do not utilize TCM services*." Unfortunately, administrative health care data and provider supplied TCM enrollment/participation data show overall engagement at less than 5%. Data issues were observed starting in 2020 requiring more reliance on enrollee survey reports. Slightly more, 10%, of enrollee survey participants acknowledge participation. The Flint Registry is credited with a significant (90%) increase in the count of referrals. Despite the lower than anticipated engagement, TCM participants report sustained participation and satisfaction with the benefit. Due to the low participation documented through administrative health care data, statistical testing to compare participants vs. non-participants among the cohort of FME enrollees was not performed.

Domain 3, Improved Health Outcomes, are expected to improve because of FME enrollment. The hypothesis reads "*Enrollees will have improved health outcomes compared to non-enrollees with similar individual and neighborhood characteristics*." Small cell sizes impacted the ability to conduct statistical testing on the combination childhood immunization measure. The comparisons for combination adolescent immunization and low birth weight rate between the FME enrollees and the Comparison group were not statistically significant. According to enrollee survey responses, FME enrollees do report statistically significant increases in the proportion of children having an "excellent" overall health status at Wave 2 along with a statistically significant decrease in the proportion of respondents reporting their child was diagnosed with a behavioral/emotional problem by a health care provider.

Administrative data to support testing **Domain 4** is not available. The lead investigation data are largely collected and managed by agencies outside of Medicaid. The hypothesis states, "*The lead hazard investigation program will reduce estimated expected ongoing or re-exposure to*

lead hazards in the absence of this program." Data sources to inform this domain include the enrollee survey and *Flint Lead Free* community reporting. A significant decrease in the proportion of children having self-reported EBLL was reported from Wave 1 to Wave 2 surveys. This decrease was maintained through Wave 3 results. Expanding investigation services without requiring an elevated blood lead level (EBLL) identifies children at risk before they suffer the exposure. The proportion of environmental investigations done on homes without documented EBLL rose from 13% to 97% according to the 2021 report.

The results in this report reflect the findings obtained during the evaluation activities from January 2018 through December 2021. Early results suggest the waiver has provided a level of success in achieving the state's overarching goal to "*identify and address any physical or behavioral health issues associated with actual or potential exposure to lead hazards."*

General Background Information

In 2016, the Michigan Department of Health and Human Services (MDHHS) received an 1115 waiver from the Centers for Medicare and Medicaid Services (CMS) to expand Medicaid coverage and benefits to individuals affected by the Flint Water Crisis.

The Flint Water Crisis occurred when the city's water source was changed in April 2014 to the Flint River. This water source did not receive proper treatment and subsequently caused lead and other toxins to leach from pipes. The main effect was increased incidence of elevated lead levels in tap water and in children's blood. Over 100,000 residents were affected and among those were approximately 25,000 infants and children.[3] In January 2016, President Obama declared an emergency in Flint, leveraging federal aid to support state and local response efforts.

The Flint Medicaid Expansion (FME) Waiver provided and continues to provide expansion of health services to address potential health risks and diseases possibly incurred during exposure to lead during the Flint Water Crisis. As of February 28, 2021, lead exposure continues to be an environmental risk in the community since all water supply lines have not yet been replaced. Because lead is a known neurotoxin[2] and most of the community was affected, MDHHS applied for the waiver to expand Medicaid coverage to individuals who may have been exposed, but not eligible for Medicaid due to income limitations. Given the known adverse impact on early neurological development,[5] the target populations identified in the original application included infants and children as well as pregnant women.

The overarching goal of the MDHHS waiver application was to "*identify and address any physical or behavioral health issues associated with actual or potential exposure to lead hazards.*" The demonstration waiver expanded eligibility of all Medicaid benefits for low-income children (up to age 21 including children born to eligible pregnant women) and pregnant women (through two months post-delivery) served by the Flint water region from 4/25/2014 through the date where upon the water is deemed safe. As of February 28, 2021, the water has not yet been deemed safe throughout the community although lead levels are below national thresholds. The specific expansion of eligibility modifications included:

- Increase income threshold to offer coverage to children in households with incomes from 212% federal poverty level (FPL) up to and including 400% FPL.
- Increase income threshold to offer coverage to pregnant women in households with incomes from 195% FPL up to and including 400% FPL.
- Eliminate cost sharing and Medicaid premiums for eligible children and pregnant women served by the Flint water system.

- Permit eligible children and pregnant women above the 400% FPL and served by the Flint water system to buy into Medicaid benefits by paying premiums.

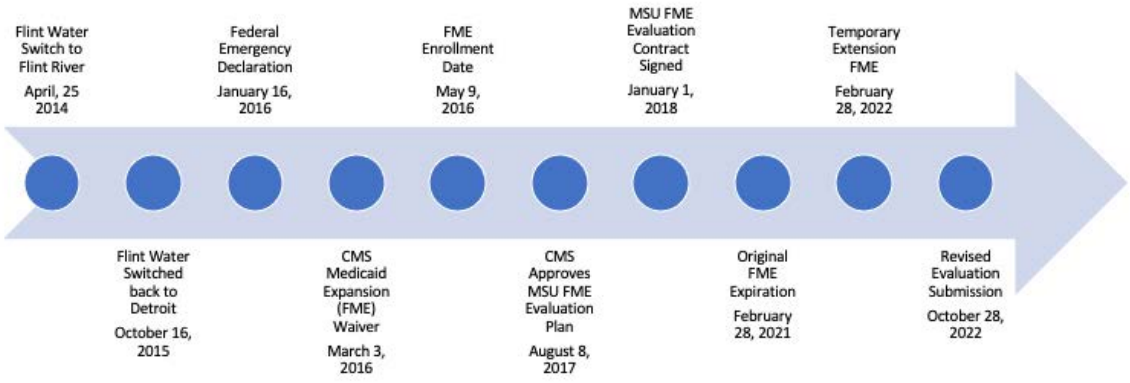
The demonstration also added a Targeted Case Management (TCM) benefit to all low-income children (up to age 21 including children born to eligible pregnant women) and pregnant women (through two months post-delivery) served by the Flint water system as of 4/25/2014. The intent of the TCM benefit was to:

- Assist enrolled eligible children and pregnant women served by the Flint water system to gain access to needed medical, social, educational, and other service(s).

The *Flint, Michigan Section 1115 Demonstration #11W 00302/5* waiver was approved March 3, 2016, and enrollment commenced on May 9, 2016, approximately two years after the water switch date of April 25, 2014. A condition of this waiver authorization was the requirement for an independent evaluation. Michigan State University's Institute for Health Policy (IHP) collaborated with CMS on the evaluation goals and activities. The evaluation plan was approved by CMS on August 8, 2017. The contract between MDHHS and MSU to authorize the work was effective January 1, 2018.

Multiple key dates were considered to anchor the evaluation work including water switch date, waiver approval date, and waiver enrollment date. Figure 1 provides a timeline of the key dates associated with the Flint Water Crisis that were under consideration.

Figure 1: Flint Water Crisis Timeline of Key Events



The original anchor point identified for evaluation activities was April 1, 2016. Shortly after the start of the evaluation work, the anchor point was revised to May 1, 2016, to coincide with the initial waiver enrollment date of May 9, 2016. Rationale for this decision was that the influence of the waiver activity would be most closely accounted for with a twelve-month reporting cycle

running from May through April. Due to the two-year gap between the water switch and waiver enrollment, three main timeframes are considered:

Table 1: Evaluation Timeframe Reference

Timeframe Code	Timeframe Description
T1	Baseline year prior to the water switch (May 1, 2013 – April 30, 2014).
T2	Post water switch, FME not implemented (May 1, 2014 – April 30, 2016).
T3	Post water switch, FME implemented (May 1, 2016 – present).

The evaluation team includes faculty and staff from IHP as well as faculty from the College of Human Medicine's Department of Epidemiology and Biostatistics, Division of Public Health, and the Office of Research. Additionally, faculty and staff from the College of Social Science and Office for Survey Research are members of the evaluation team. Faculty and staff from the College of Education contributed expertise and assistance in obtaining and interpreting publicly available MI Schools Data Dashboard information during calendar year 2021.

The evaluation findings contained in this report reflect the activities conducted by the evaluation team during calendar years 2018 through 2021. The waiver was originally scheduled to end February 2021. A one-year temporary extension through February 2022 was granted to MDHHS by CMS. Thus, the final evaluation report submission date has been moved from the original April 2021 date to an October 2022 submission date.

Evaluation Questions and Hypotheses

The MDHHS Waiver application referred to four domains and specific hypotheses in which the expanded Medicaid offerings would support attaining the overall waiver goal. IHP developed specific sub-hypotheses intended to support the MDHHS hypotheses. A summary matrix of all measures by domain and steward is available in Appendix 1. A copy of the approved evaluation plan is provided in Appendix 2.

- Domain 1: Access to Care
- Domain 2: Access to Targeted Case Management
- Domain 3: Improved Health Outcomes
- Domain 4: Lead Hazard Investigation

Domain 1: Access to Care

The approved demonstration provided Medicaid coverage and access to health care services to a cohort of individuals who were exposed to lead contaminated water and therefore potentially at risk for physical and behavioral issues. The original Hypothesis 1 proposed in the waiver application was "*Enrollees will access services to identify and address physical or behavioral health issues associated with lead exposure at a rate higher than others with similar levels of lead exposure.*"

The evaluation team did not have sufficient power to test Hypothesis 1 as originally expressed because the number of individuals with elevated blood lead levels (EBLL) were found to be low. A complete description of this finding and implications is presented in the Results*: "Comparison Group Considerations"* section. Thus, the evaluation team modified the wording of the hypothesis to reference another comparison population, that being *non-enrollees with similar individual and neighborhood characteristics*. The revised hypothesis reads "*Enrollees will access services to identify and address physical or behavioral health issues associated with lead exposure at a rate higher than non-enrollees with similar individual and neighborhood characteristics*." The related sub-hypotheses were similarly adjusted to reference the available comparison group.

Nine (9) sub-hypotheses make up Domain 1 and several of the sub-hypotheses include multiple discrete measures addressing children and pregnant women eligible for the waiver. The overall objectives were to evaluate the use of specified services, including well-child visits, developmental screening assessments, testing and retesting of blood lead levels in pregnant women and children, prenatal and postpartum care, maternal infant health program (MIHP) participation, and improved care and satisfaction.

Children/Pediatric Measures:

1. A greater proportion of enrollees will obtain age-appropriate well-child exams than non-enrollees with similar individual and neighborhood characteristics.
2. A greater proportion of enrollees will receive age-appropriate developmental screening/assessments than non-enrollees with similar individual and neighborhood characteristics.
3. A greater proportion of enrollees will receive age-appropriate lead testing than non-enrollees with similar individual and neighborhood characteristics.
4. A greater proportion of enrollees with high blood lead levels will receive re-testing at the appropriate intervals than non-enrollees with similar individual and neighborhood characteristics.

Pregnancy Measures:

5. Enrollees who are pregnant will have timelier prenatal and postpartum care than non-enrollees with similar individual and neighborhood characteristics.
6. A greater proportion of enrollees who are pregnant will have recommended lead testing than non-enrollees with similar individual and neighborhood characteristics.
7. A greater proportion of enrollees will participate with MIHP services than non-enrollees with similar individual and neighborhood characteristics.

Improved Care & Satisfaction Measures:

8. The majority of enrollees will attest to improved access to health care as a result of the expanded coverage.
9. The majority of enrollees will report improved satisfaction with their ability to access health care as a result of the expanded coverage.

Domain 2: Access to Targeted Case Management

The approved demonstration provided expanded benefits, specifically Targeted Case Management (TCM) to facilitate needed medical, social, educational, and other services to a cohort of individuals exposed to the contaminated water and potentially at risk for physical or behavioral health consequences. Required elements of TCM are described in MDHHS policy and include assessments, planning, linkage, advocacy, coordination, referral, monitoring and follow-up activities. In response to enrollee feedback, TCM was relabeled as Family Supports Coordination (FSC). In the interest of consistency for this report and alignment with the Waiver application and approval materials, the services will continue to be referred to as TCM throughout this evaluation document.

The original hypothesis proposed in the waiver application stated, *"Enrollees who access TCM services will access needed medical, social, educational, and other services at a rate higher than others with similar levels of lead exposure."*

Hypothesis 2 was modified by the evaluation team to allow a more robust comparison for the same issue of low numbers of persons with elevated lead levels. The revised hypothesis reads: "*Enrollees* who access TCM services will access needed medical, social, educational, and other services at a rate higher than *enrollees* with similar individual and neighborhood characteristics but do not take up TCM services." Hence, the intent was to compare TCM users vs. TCM non-users among all the FME enrollees. Hypothesis 2 encompassed four sub-hypotheses. The first two reflected operational aspects of the new benefit while the remaining two assessed for selected improvement in receipt of specific health care services.

1. Referral source and participation levels with TCM will be tracked among enrollees.
2. All TCM participants will have at least one re-assessment within one year of original assessment.
3. A greater proportion of TCM participants will have age-appropriate well child exams than the comparison.
4. A greater proportion of TCM participants will have completed age-appropriate developmental screening than the comparison.

Domain 3: Improved Health Outcomes

The third domain targeted improvements in health outcomes that were consistent with the goal of the waiver. The original Hypothesis #3 proposed to evaluate whether *"Enrollees will have improved health outcomes compared to others with similar levels of lead exposure*."

The evaluation team modified this hypothesis in a manner like that done for Hypothesis 1. Specifically, the comparison group was re-stated as non-enrollees having similar individual and neighborhood characteristics. The revised Hypothesis 3 reads "Enrollees will have improved health outcomes compared to non-enrollees with similar individual and neighborhood characteristics." Three sub-hypotheses were identified to serve as proxy measures for optimal health status. These proxy measures targeted immunization, birth weight and self-reported health status.

1. Enrollees will have higher completed age-appropriate immunization statuses than non-enrollees with similar individual and neighborhood characteristics.
2. Enrollees who are pregnant will deliver infants with higher birth weights than non-enrollees with similar individual and neighborhood characteristics.

3. Enrollees report an increase in their self-reported health status over the duration of their enrollment.

Three provisional sub-hypotheses descriptive of neurocognitive, behavioral, and educational outcomes of eligible children were proposed. These outcomes were deemed provisional due to the following concerns. First was a concern regarding the inclusion of children enrolled in the Serious Emotional Disturbance (SED) waiver as an appropriate comparison group. Secondly, access to individual education data was not granted for the evaluation.

P4. We will conduct a descriptive analysis of the proportion of children diagnosed with severe emotional disturbance and other developmental/learning disabilities including comparing rates to others with similar lead exposures,
P5. Descriptive analysis of behavioral health conditions among enrolled children (i.e., rate/proportion of children suspended or expelled), and
P6. Descriptive analysis of educational delays among enrolled children (i.e., rate/proportion of children receiving special education services, i.e., individual education plans "IEPs", early preschool performance, and reading and math scores at end of grades 3, 4, and 5).

Domain 4: Lead Hazard Investigation

The final domain was intended to support identification of persons at risk for lead exposure. The waiver expanded access to lead investigation services even when blood lead levels of persons in the residence were not elevated. The FME approval did not cover mitigation or abatement activities. Hypothesis 4 proposed in the waiver application stated, *"The lead hazard investigation program will reduce estimated expected ongoing or re-exposure to lead hazards in the absence of this program."* Hypothesis 4 included two sub-hypotheses.

1. Enrollees without EBLL and participating with TCM services will access lead hazard investigation services to the same degree as beneficiaries with EBLL.
2. Beneficiaries found to be at risk for ongoing lead exposure will be referred for additional environmental investigation.

Methodology

Evaluation Design

The approved evaluation plan (Appendix 2) proposed a pre-post design to evaluate the degree to which the FME met the overarching goal to identify and address any physical or behavioral health issues associated with actual or potential exposure to lead hazards. Critical timeframes for the purposes of the evaluation were revised to May 1, 2013 – April 30, 2014, as "pre" water switch time period (T1), the timeframe of May 1, 2014 – April 30, 2016, was considered "pre" FME implementation (T2), and each subsequent years since enrollment into FME as of May 2016 considered "post" FME implementation (T3). (Table 1, p. 5).

Target and Comparison Populations

Another design strategy of the evaluation proposal was to test a variety of comparison groups in addition to the pre-post design. The evaluation team considered a variety of potential comparison groups. The target population of the FME included individuals from any of the following groups acknowledged to be at risk for adverse outcomes related to lead exposure via the Flint Water system:

- Any pregnant woman and/or child up to age 21 with a household income up to and including 400% of the Federal Poverty Level (FPL) who has been served by the Flint water system on or between 4/1/2014 and the date water is deemed safe (Date to be determined).
- Any child born to a pregnant woman served by the Flint water system during the specified period. The child will remain eligible until age 21.
- Exposure is defined as having consumed water drawn from the Flint water system during the specified period and
    - resides or resided in a dwelling connected to Flint water system service lines;
    - is employed and/or had employment at a location served by the system; or
    - is receiving or received childcare and/or education at a location connected to this system.

The Eligibility Protocol further clarified eligibility criteria to include individuals who were incarcerated or who resided in a health care facility at a location served by the Flint water system. Four potential comparison groups were identified in the original evaluation proposal:

1. Medicaid enrollees residing in the target Flint area based on water exposure map in the year prior to the water switch.
2. Commercially insured individuals in Michigan.

3. Communities known to have similarly elevated lead exposures.
4. Enrollees covered through Michigan's Serious Emotional Disturbances (SED) waiver.

Each of these was associated with limitations. The main concern for Comparison Group 1 was that even if these enrollees had similar water lead exposure prior to the water switch, they would not have similar exposure after the water switch. The main concern for Comparison Group 2 was an inability to acquire commercial insurance data. The main concern for Comparison Group 4 was the relatively small number of enrollees in the SED waiver (approximately 400 statewide) along with the significantly greater acuity and need for services these enrollees are known to require. Specifically, SED waiver enrollment requires an individual to meet criteria for admission to the state inpatient psychiatric hospital. Upon reflection of the cohort in Comparison Group 4, the evaluation team concluded the groups were more dissimilar than similar which compromised their ability to serve as comparators. Thus, we focused on exploring communities potentially having similar elevated lead exposures identified as Comparison Group 3. Unfortunately, Group 3 was compromised by the low numbers of persons having EBLL (Table 2). The impact of the coronavirus pandemic for the 5/1/2020 – 4/30/2021 reporting period further depressed the reporting numbers. Published statewide reporting from the MITracking data portal of lead testing for all of Genesee and Saginaw counties decreased by nearly half from 2019 to 2020. The decline being attributed to stay-home orders, business closures and the increase in virtual care as a replacement for in-person visits.[11]

Table 2. Number of children under 6 years with elevated blood lead level in Genesee & Saginaw counties

Race/Ethnicity	FME status	5/16 - 4/17	5/17 - 4/18	5/18 - 4/19	5/19 - 4/20	5/20 - 4/21
non-Hispanic White	non-FME	58	52	50	58	*
non-Hispanic White	FME	51	32	29	7	*
non-Hispanic Black	non-FME	42	44	54	53	*
non-Hispanic Black	FME	90	52	37	24	*
Hispanic/Other	non-FME	8	18	17	16	*
Hispanic/Other	FME	*	*	*	*	*
Unknown	non-FME	8	6	10	6	*
Unknown	FME	*	*	*	*	*

*Cells less than or equal to 5 suppressed

Ultimately, the evaluation team developed a more robust Comparison Group 5.

5. Beneficiaries with similar individual and neighborhood characteristics at the census tract level.

A variety of statistical methods were applied during 2020 resulting in Saginaw County being identified as a reasonable community comparison. The evaluation team considered two main approaches in the selection of Comparison Group 5 (see Appendix 8 for more detail). In the first approach, we considered the K means method[12] to find a lower-peninsula county like Genesee County in health outcomes, health behavior, clinical care, social economic environment, and physical environment. These vital health factors are used by the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute to rank counties in the U.S.[13] We chose these confounding characteristics (a total of 48 variables) under the assumption that counties with similar characteristics affecting lead exposures would have similar levels of lead exposures. We used the Gap statistic[8] to first estimate the number of clusters in the data and then used 5,000 random starting values to run the K means algorithm to count how many times a county was assigned to the same cluster as Genesee County. The county that was most often clustered together with Genesee County was chosen as the comparison county. The evaluation team used this method for a similar evaluation project.[12]

The second approach the evaluation team considered was the synthetic control (SC) method.[9] Since no single county was as like Genesee County in all characteristics under consideration, we explored using a weighted combination of counties as the "control" county. The key data for this approach was the Michigan Childhood Lead Poisoning Prevention Program Data Report series from 2012 to 2019. The SC idea is to impute a counterfactual outcome of Genesee as a weighted average of other lower peninsula counties. The weights are computed by minimizing a vector distance between Genesee and other counties over a set of pre-treatment covariates that are predictive of the outcome (e.g., EBLL). A limitation of the SC method is that it requires re-calibration of weights for each hypothesis because different counterfactual weights may be required to construct a synthetic control that is similar in the respective hypothesis being tested. Summary measures at the county level for each hypothesis several years prior to the water switch or waiver expansion will also be required. County level estimates of the majority measures identified for this evaluation are not available.

Both approaches were limited by data availability and comparisons would have been ideal at the city level. The cities of Pontiac and Saginaw were considered because they were similar in size, racial composition, socioeconomic distress, initial development, economic trajectory, and current housing landscape as Flint. Thus, risk factors for lead exposure may also be similar across all three communities. Pontiac was additionally suitable as a comparison community because, like Flint, it has been served by the Great Lakes Water Authority (formerly the Detroit Water & Sewerage Department). These communities further share the existence of a spread of wealthier suburbs surrounding them which may offer comparison opportunities. Additional potentially suitable communities included the smaller metropolitan areas of Jackson, Muskegon, and Kalamazoo. However, city-level data were difficult to obtain which made it difficult to quantify the similarities. Thus, we restricted our choice of geographic comparison group to the county level.

The K-means analysis confirmed that Saginaw County would be a suitable option for Comparison Group 5. Upon identification of the comparison community, the MDHHS Data Warehouse was accessed for claims/encounter data for all Medicaid enrollees residing in Saginaw County from May 2013 through April 2021. History of comorbidity and/or census-tract level social/economic background were adjusted when appropriate in regression models. A more robust description of the procedure and analyses for selecting the comparison group is described in the Preliminary Results section and Appendix 8.

Evaluation Period

The original FME approval was for the period 3/3/16 - 2/28/21 with a state identified enrollment date of 5/9/16. CMS approved the evaluation proposal 8/8/17 and the evaluation contract between MDHHS and MSU was established December 2017. Formal evaluation activities began January 2018. The evaluation proposal identified the evaluation period as 1/1/2018 through 4/30/2021 allowing a sixty-day period to finish up a final report after the original waiver period expired. MDHHS was granted a one-year extension of the FME Waiver through February 2022 allowing additional evaluation activity to occur during calendar year 2021. This report provides a cumulative account of the evaluation activities carried out through December 31, 2021, incorporating utilization data through 4/30/2021. An additional year of utilization data through 4/30/2022 will be available in the final evaluation report to be submitted October 2022.

Although the evaluation activities commenced in January 2018, historical data to reflect the year prior to the water switch has been obtained where available. Due to the pre-post design and the predominant reliance on administrative datasets for many of the evaluation sub-hypotheses, the full time period of health care claims/encounter and blood lead testing data reached back to 5/1/13 or one year prior to the water switch (T1) to provide baseline estimates. While this allowed a small number of days of “post water switch” to be included in the baseline timeframe, the impact on measure reporting was believed to be negligible. Table 1 (page 5) reflects the periods included in the evaluation.

Evaluation Measures

As previously stated, the overarching goal of the FME was to *identify and address any physical or behavioral health issues associated with actual or potential exposure to lead hazards*. Thus, specific evaluation measures were selected for their relevance to known impacts of lead as a neurotoxin on developing physiological systems. In addition, recommended measures of preventive and screening services were included. The waiver also authorized individuals at higher income levels to qualify, offering a chance to measure uptake in targeted services across

socioeconomic levels. The summary matrix of all measures by domain and steward is available in Appendix 1.

The specific evaluation measures associated with Hypothesis 1 included specific Health Plan Employer Data Information Set (HEDIS) measures endorsed by the National Quality Forum (NQF).[4] The focus of the first hypothesis was to evaluate enrollee access to services and compare enrollee access with a comparison group. The selected measures included:

1.1. Age-appropriate well-child exams;
1.2. Age-appropriate developmental screening;
1.3. Age-appropriate blood lead testing;
1.4. Appropriate re-testing for individuals with elevated blood lead levels;
1.5. Timely prenatal and postpartum care for pregnant women; and
1.6. Recommended blood lead testing for pregnant women.

The remaining measures included items that were specific to Michigan. For instance, participation in a program intended to support positive birth outcomes, the Maternal Infant Health Program (MIHP) was added. It was expected that individuals receiving TCM support would be more likely to receive referrals to, and participate in, MIHP.

1.7. Pregnant women participation in MIHP.

The evaluation team felt it was important to solicit feedback directly from FME participants to ascertain whether the expanded eligibility and TCM services supported them in accessing services. An enrollee survey was designed to address the final two measures:

1.8. Enrollee attestation to improved access to health care; and
1.9. Enrollee report of improved satisfaction with ability to access health care.

Hypothesis 2 focused on the additional TCM service added as a new benefit with the waiver. The intention of this benefit was to facilitate needed medical, social, educational, and other services for those who were exposed to the contaminated water. TCM provided an opportunity for enrollee education and support as well as assistance navigating the health care system and helping to mitigate barriers to care. Therefore, the measures associated with the sub-hypotheses were selected for their significance to the operational and implementation aspects of the benefit. As such, these measures were specific to Michigan.

2.1. Use of referral services by TCM participation level;
2.2. Proportion receiving at least one re-assessment within one year of original TCM assessment;

2.3. Proportion of TCM recipients having well-child exams will exceed proportion compared to TCM non-participants; and
2.4. Proportion of TCM recipients having developmental screenings will exceed proportion compared to TCM non-participants.

Hypothesis 3 in the waiver application addressed improved health outcomes. Because the full impact of lead exposure on a child's developing nervous system cannot be assessed for several years, three process measures were identified as proxies for clinical outcomes.[3] Process measures validated by national organizations were used to measure clinical outcomes based on known associations between these metrics and general health status.[4]

3.1. FME enrollees will have greater age-appropriate immunization completion;
3.2. Pregnant FME enrollees will deliver infants with greater birth weights; and
3.3. Self-reported improvement in health status.

As the enrollee survey was designed, the potential for TCM providers to impact enrollees holistically with their health care needs was realized. The TCM providers had opportunities to ensure appropriate referrals and services for a host of health conditions including chronic conditions. Thus, several additional questions regarding chronic disease and self-management capacity were included in the enrollee survey to inform evaluation questions regarding changes in health status.

This domain also included three *provisional* hypotheses regarding educational measures and performance. These measures were developed in-house. The following measures were deemed provisional due to concerns regarding the appropriateness of children enrolled in the Severe Emotional Disturbance (SED) waiver as a comparison and/or the availability of the necessary data to fully investigate them.

3.4. Conduct a descriptive analysis of the proportion of children diagnosed with severe emotional disturbance and other developmental/learning disabilities including comparing rates to others with similar lead exposures.
3.5. Descriptive analysis of behavioral health conditions among enrolled children (i.e., rate/proportion of children suspended or expelled).
3.6. Descriptive analysis of educational delays among enrolled children (i.e., rate/proportion of children receiving special education services – IEPs, early preschool performance, reading and math scores at end of grades 3, 4, and 5).

The federal Department of Education denied the state's request for a FERPA waiver limiting the evaluation's ability to link health and education data at an individual level. Information regarding presence of behavioral health conditions and educational delays was collected from parents/guardians of children enrolled in the waiver from the enrollee survey. The evaluation

team also used publicly available education data through Mi School Data to provide a high-level accounting of reported educational delays and provision of special services at a school district level.

Hypothesis 4 referenced the Lead Hazard Investigation that was expanded through the FME waiver. Mitigation and abatement efforts to home sites with lead hazards were not funded through the Medicaid expansion. The FME waiver authorized funding to conduct screening and assessment of environments to assist with case finding. Prior to the FME waiver, documentation of an EBLL was necessary to refer a property for lead exposure investigation. This requirement was relaxed by the FME waiver so that home sites could be assessed in the absence of a documented EBLL. The details of environmental assessments and mitigation efforts are supported and documented by governmental agencies outside of Medicaid compromising the evaluation team's ability to quantify levels of lead exposure. Thus, developed metrics took into consideration the effect of additional Medicaid funds in facilitating additional screening and case finding. The enrollee survey was again targeted to provide some information regarding ongoing lead exposures.

4.1. Prevalence of lead hazard assessment/investigation.
4.2. Prevalence of those at risk for ongoing lead exposure receiving referrals for additional environmental investigation.

Data Sources

Major sources of data used to support evaluation activities from January 2018 through December 2021 included: 1) the MDHHS Health Services Data Warehouse (Medicaid enrollment, claims/encounter data, Lead Poisoning Prevention Program Data), 2) TCM program information (administrative data and Wave 1, 2, and 3 Key Informant Interviews), 3) Enrollee Survey (Wave 1, Wave 2, and Wave 3), and 4) publicly available reporting (MI Schools Dashboard, County Health Rankings, and census tract data in American Community Survey).

MDHHS maintains a data warehouse containing information at an individual level regarding a variety of health-related services and data points. IHP employs staff with the necessary permissions and expertise to access the MDHHS Health Services Data Warehouse and acquire the elements needed to support analyses through an honest broker arrangement. However, despite the storage of a variety of health-related program data in the Health Services Data Warehouse, access to these data is controlled by each program.

MDHHS Health Services Data Warehouse – Enrollment and Utilization

Specific information contained within the data warehouse included Medicaid eligibility/enrollment records, final paid Medicaid claims/encounter data, and blood lead program data. While much of the Medicaid claims/encounter data lack clinical care values, the Michigan Childhood Lead Poisoning Prevention Program does collect this information. The State of Michigan further maintains a master person index to facilitate matching of individuals between different programs so that individuals covered through Medicaid will be linked to their blood lead testing dates and values when present. Access to the Michigan Care Improvement Registry was granted during 2021 which provided additional information regarding vaccinations provided regardless of payer. The data contained in the Data Warehouse served as a primary source to test the bulk of the sub-hypotheses in Domain 1. This source also supported elements of Domains 2 and 3.

Ongoing review of routinely reported information is conducted by MDHHS program and warehouse staff to identify potential issues with data loading or when changes to warehouse tables are made. The evaluation team did not validate the data extracted from the warehouse with primary sources such as medical record reviews. Instead, conversations between the IHP staff responsible for pulling data and state program staff occurred and continue to occur to ensure that relevant fields are captured, and coded variables are correctly interpreted. Data review is an ongoing, iterative process and continues throughout the duration of the evaluation. Independent review and validation of code used to process data and conduct statistical analyses was performed by evaluation team statisticians.

The health care data acquired for the timeframe 5/1/2020 – 4/30/2021 was less than prior years based on a raw number of total claims/encounters for the enrolled population. This was attributed in large part to the impact of the state stay-home orders that were mandated during the coronavirus pandemic. These shut-downs were imposed mid-March 2020 with end dates varying based on industry. Accompanying outright closures, shifts in delivery of services to telemedicine, and patient concern over potential exposure from having preventive type of services may all have contributed to these declines. These availability of telemedicine visits unfortunately, would not result in services like blood testing or immunizations being performed. The evaluation team will conduct a drill-down on these data to determine if types of care were disproportionately affected (i.e. office visits vs. urgent care/emergency department visits, well visits vs. illness visits) as well as work with state partners to identify potential delays or errors in data loading or processing ahead of the final evaluation report.

Targeted Case Management Program Information

The supplementary TCM benefit approved in the waiver necessitated additional data sources to support the evaluation beyond the claims/encounter information contained in the MDHHS

Health Services Data Warehouse. While the provision of TCM services were identified through specific procedure codes entered onto billing data, the ability to discriminate between specific services was not available via this administrative data. The evaluation team established a Business Associates' Agreement (BAA) with Genesee Health System (GHS) to authorize access to their records for purposes of this evaluation. The hope was that additional detail, regarding specific service delivery, would be available from this source. Unfortunately, the available documentation did not permit evaluators to discriminate between referrals to address needs associated with the water exposure versus referrals to address other pre-existing or concomitant social, physical, or behavioral needs. GHS continues to provide enrollment data to the evaluation team upon request to support evaluation efforts. However, for the 2021 reporting the numbers for enrollment are limited and/or not representative of usual enrollment due to the pandemic.

An additional data source regarding the TCM benefit was a key informant interview conducted with individual(s) employed as TCM case managers. These data were obtained through a telephone survey implemented during the second quarter of 2019 (Wave 1) and one year later in 2020 (Wave 2). A discussion guide was established to facilitate consistency of information and one registered nurse staff member from IHP conducted all the telephone interviews for Waves 1 and 2. In 2021, the Wave 3 survey was administered, via a Qualtrics online survey, to TCM case managers employed by Genesee Health System and the Greater Flint Health Coalition. Survey questions were closely aligned with the in-person phone survey. The draft summary report was shared with the informants to ensure accurate representation of their information. Refer to Appendix 4 for the TCM Key Informant Interview documentation. These sources supported testing of hypotheses in Domain 2.

Enrollee Survey and Reporting

Enrollee survey data represented another major data source to inform the evaluation. Key measures of the evaluation such as inquiries regarding improvements in access to care or health outcomes required input from those enrolled in the FME waiver. The original survey plan was to conduct three survey waves approximately twelve months apart to capture trends over time. Modifications to the original survey plans were necessary due to the period involved with evaluation plan approval and contracting. This original design was modified to maintain three waves but have each wave spaced approximately nine months apart. The extension granted to the state through February 2022 allowed the evaluation team to implement a 4th wave to enrollees starting fourth quarter of 2021. The addition of a web-based participation option implemented in response to community feedback before Wave 1 was kept for all four waves. Enrollees were offered an additional $10. incentive payment to complete this extra wave.

The enrollee survey was also designated to provide education-related information since data was not available from the Michigan Department of Education. The evaluation team included

several questions on the child version of the survey inquiring about school grade level and whether children had been identified as having learning problems and behavioral/emotional problems. The goal of these questions was to provide self-reported data regarding the impact of the lead exposure on educational performance.

Wave 1 was conducted from December 2018 through May 2019; Wave 2 was in the field from October 2019 through April 2020; and Wave 3 was fielded from August 2020 to February 2021. The follow-up rate between Wave 1 and Wave 2 was 67%. Wave 3 had a 74% retention rate. Wave 4 was conducted between November 2021 and February 2022. All paper surveys were blind double data entered. Surveys completed by telephone were subjected to monitoring by supervisory staff. Web-based responses to the survey were directly entered by the respondent. In addition to using a two-factor authentication process for a selected respondent to access the online survey, the web survey allowed only one response per unique credential. This prevented participants from completing more than one survey. The online survey was further protected from non-FME enrollee participation by restrictions imposed on the ability of internet search engines to locate the survey. Refer to Appendix 3 for copies of the survey tools.

Publicly Available Data

Due to the realization that certain data elements proposed in the original evaluation plan were not available, the evaluation team identified publicly available datasets that could provide similar information. These publicly available data sources could not be relied upon to test any hypotheses targeting FME enrollees versus non-enrollees. However, they served to provide context to findings of the evaluation with the intention of documenting larger, community-wide shifts in similar measures over similar timeframes.

Particularly, the provisional hypotheses 3.4 – 3.6 were compromised due to the FERPA exemption denial. Public reporting of education system information is available in Michigan through the MI Schools Data dashboard. Comparison datasets containing historical data back to 2012 for Genesee County and Saginaw County have been identified. The County Health Rankings published by the University of Wisconsin contain health status question(s) as well as measures of access to care and general preventive services. The American Community Survey was used to provide socio-economic data at the census tract level to assist with comparison community selection.

Mi School Data

Adverse impacts of lead can be identified through education/ learning delays and behavioral problems. Thus, several meetings were held with representatives from the Michigan Department of Education (MDE) in 2018. Discussions were held regarding permissions to link children covered through the FME waiver to MDE data. MDE representatives clarified FERPA restrictions and explained that an exemption from the federal government would be required

to access data at the individual level. Unfortunately, the federal Department of Education denied the exemption.

Due to the inability to link individual level school data to existing Medicaid data, the evaluation team leveraged school district publicly available reporting through Mi School Data. The publicly available Mi School Data dashboard allows users to access aggregate data from Michigan Schools pertaining to early childhood through high school. Available metrics reported through Mi School Data include participation in early childhood programs, grade progression (i.e., students retained in grade), and educational delays. Four-year graduation and drop-out rates are also available. Continuity of special education services is reported both for the Early Childhood period including pre-Kindergarten as well as through secondary education. Distribution of selected disabilities is available. State standardized testing is reported through the dashboard including performance at 3rd, 4th, 5th, 6th, 7th, and 8th grade content. Generally, these data are reported annually. However, a gap in state testing was experienced during the 2020 COVID-19 pandemic and will be unavailable.

It is noted that Flint and Genesee County have a total of 22-25 school districts that serve the area. The organization of the districts is distinct from many other Michigan counties because of the presence of numerous charter schools. The Flint Community School District (FCSD) is the largest school district, but not all FME enrollees attend FCSD. An additional complexity to Michigan schools is the state's Schools of Choice policy. This permits students to attend schools outside of the district in which they reside. Some estimates are available through the Mi Schools dashboard reflecting student mobility which may inform the relative stability of the student population.

University of Wisconsin County Health Rankings

County Health Rankings published by the University of Wisconsin were accessed for the years 2013 – 2020. These reports were obtained to provide community-based context to key measures that were related to the evaluation hypotheses. Target measures available through these reports included self-reported health status, low birthweight rate, and uninsured rate information. Data from 2021 and 2022 will be accessed for the final report.

MI Medicaid Statewide Weighted HEDIS Measures

Although the MI Medicaid summary HEDIS statewide report reporting reflects statewide estimates rather than county level information, these reports were obtained to provide additional context to the results attributed to FME enrollees and the Saginaw County Medicaid enrollee comparison individuals. In addition to the inability to restrict analyses based on geography, the utility of the summary HEDIS reporting was compromised by the realization that several of the targeted measures allowed for hybrid (administrative and medical record review)

reporting method by health plans. The evaluation team was restricted to using just administrative data which is known to under-report service rates.

The statewide HEDIS reporting also provided some indication of broader trends in selected health care utilization that may have resulted from the coronavirus pandemic. The 2021 HEDIS Aggregate report identified statistically significant decreases in weighted statewide averages for the following measures: Childhood Immunization Status (combinations 2, 3, 4, 5 and 7), lead screening in children, Adolescent Immunization Status (combinations 1 and 2), prenatal and postpartum care. Thus, we may reasonably expect the declines noted among the FME enrollees are not unique to this cohort but reflective of the pandemic environment more systematically.

American Community Survey Census Tract Level Data

We clustered individual beneficiaries to census tracts and used two existing data sources to measure neighborhood characteristics when evaluating similarities between FME enrollees and potential controls. These data are:

- Childhood opportunity index[14] (COI), a multidimensional depiction of the neighborhood beyond the population composition and socioeconomic conditions. It includes health and environmental measures such as access to green space, walkability, and health insurance coverage.
- Social vulnerability index (SVI)[17], a ranking of census tracts on 15 social factors in four related themes (domains): socioeconomic (income, poverty, employment, education), household composition and disability (age, single parenting, disability), minority status and language (race, ethnicity, English-language proficiency), and housing and transportation (housing structure, crowding, vehicle access). Each tract receives a ranking for each of the four themes, and an overall ranking. We used the 2016 and 2018 SVI data from the CDC website for the periods before and after the waiver expansion.

Analytic Methods

Tests of significance (Chi-square and t-tests, etc.) to ascertain group differences and change over-time were originally planned to monitor the measures reported on an annual basis. However, as the evaluation evolved, the team changed to regression-based methods. Outcomes that permit longitudinal assessments were tested using cluster-robust methods accounting for the potential nesting of observations within the same individual; and outcomes that do not permit longitudinal assessment were tested using logistic regression with cluster-robust standard errors clustered at the census tract level. Because the expansion criteria have the potential to change the population composition of enrolled individuals over time, the evaluation team monitors the population composition.

Enrollee Survey Sample Selection

The population eligible to participate in the initial survey included enrollees who had at least six months of continuous enrollment in the FME waiver and were enrolled as of November 1, 2018. This inclusion criteria identified 24,080 unique enrollees. The sample was selected in two stages to identify a sample pool of 11,452 for Wave 1. In the first sampling stage, the sampling frame was divided into three groups based on the enrollee's residence. These residential categories were selected upon the evaluation team's recognition that the FME waiver enrolled individuals were more geographically dispersed than had been anticipated. The residential categories established included:

- Only Genesee County – enrollees who appeared to only reside in Genesee County based on available enrollment record history.
- Partial Genesee County – enrollees who resided both in and out of Genesee County based on the available enrollment record history.
- Never Genesee County – enrollees who had no enrollment data to suggest they ever resided in Genesee County. However, these individuals were flagged as being enrolled in the FME waiver per benefit plan assignment by MDHHS and therefore were included.

We intended to apply stratified random sampling by residence category resulting in 11,452 potential participants for Wave 1 (refer to Table 3). The first stratum is residential category, and the second stratum is age group. Among those in the Only Genesee and Never Genesee categories, we randomly selected approximately 10,000 enrollees and 1,000 enrollees, respectively. However, due to the small number of enrollees in the Partial Genesee Category, the team elected to retain all individuals identified regardless of Age Category (n=596). The total number of enrollees selected for survey inclusion were then equally split into four batches to manage the mailing process.

Table 3. Number of enrollees selected for survey sample out of total eligible population

		Residence Category			
	Age Category (Years)	**Only in Genesee N (%)***	**In and Out of Genesee N (%)**	**Never in Genesee N (%)**	**Total N (%)**
Population Count	0-6	7,561 (31.4)	321 (1.3)	793 (3.3)	8,675 (36.1)
	7-17	11,671 (48.8)	351 (1.5)	999 (4.2)	13,021 (54.1)
	>=18	2,117 (8.8)	69 (0.3)	198 (0.8)	2,384 (9.9)
	Total	*21,3494 (88.7)*	*741 (3.1)*	*1,990 (8.3)*	*24,080*
Sample Selection Count	0-6	3,509 (30.6)	245 (2.4)	372 (3.3)	4,126 (36.0)
	7-17	5,418 (47.3)	270 (2.4)	468 (4.1)	6,156 (53.8)
	>=18	1,019 (9.0)	54 (0.5)	97 (0.9)	1,170 (10.2)
	Total	*9,946 (86.7)*	*596 (5.0)*	*937 (8.2)*	*11,452*

*Proportions reflect sub-category representation among the Total Count of all Enrollees

Nearly 50% population was selected because of the longitudinal nature of the survey. The evaluation team was concerned with retaining enough for analysis at the end of Wave 3. The period required to implement all three waves was eighteen months. A larger than normal sample was also deemed necessary based on concerns regarding the level of participation among these individuals who have been inundated with survey requests by a multitude of organizations. The evaluation team received anecdotal reports that some attorneys recommended area residents against participating in surveys due to potential future civil litigation. The impact of these recommendations on all survey response rates was not quantifiable.

Additional Considerations

IHP engaged in discussions with MDHHS and CMS regarding evaluation tasks and activities during the evaluation approval and contracting process. Upon execution of the contract, the evaluation team submitted the project to the MSU Institutional Review Board for review. The project was determined to not meet the definition of research on 1/22/18 and is considered exempt (refer to Appendix 5).

The evaluation team communicated and met regularly in workgroups at the onset of the evaluation to ensure progress and efficiency. All evaluation team members are members of the Full Workgroup with topical workgroups established to focus attention and activities on discrete elements of the FME workplan (see Table 4). In response to changes in the execution of the evaluation over time, some of the original workgroups were modified. Specifically, the meeting cycle of the Full workgroup was decreased to a quarterly basis as many of the members had roles in the Data and Survey groups. The Data and Survey groups were merged during 2021 and continued to meet bi-weekly. The Community Asset Inventory group was disbanded early in the evaluation due to concerns expressed by representatives of the Flint community. Additionally, membership of the Education workgroup evolved to a partnership with the College of Education considering the need to rely on public data sources. Outside of the workgroups, communication to troubleshoot and resolve questions occurred as they arose. Drs. Ford and Oberst remain responsible for project supervision.

Table 4: Flint Medicaid Evaluation Workgroups

Workgroup Title	Frequency	Purpose
Full	Quarterly	Full team meets regarding progress and communication between the other workgroups.
Survey	Bi-Weekly	Design and administration of the enrollee surveys. Communication with Flint community partners to avoid duplication and enrollee surveys. Design and administration of TCM key informant interviews.
Data	Bi-Weekly	Updates on data preparation, data management and analyses. Creating data files to include target variables.
Community Asset Inventory	*Disbanded*	Create and maintain inventory of all community entities and key stakeholders that provide services related to Flint Water Crisis. Communication with major key stakeholders to inform the evaluation. Workgroup was disbanded due to community fatigue and concerns.
Education	As Needed	Ongoing communication with Flint Community Schools, Genesee Intermediate School District, GHS, Neurodevelopmental Center of Excellence (NCE), and other key stakeholders. Due to the inability to obtain individual level education data, publicly available MI School Data was identified as the target data source with support from the MSU College of Education.

Timeline Modification

The timeline proposed in the original evaluation plan submission required initial modification to adjust for the time required for evaluation plan approval and contracting activities. As the activities unfolded between 2018 and 2021, further adjustments became necessary as additional information regarding potential data sources became available. Delays in some activities were also encountered due to government shut-downs in response to the COVID-19 pandemic. The evaluation's timeframe was based on calendar year to coincide with federal reporting timelines and as a result, activities may span more than one state fiscal year reflected as the contracting year in Table 5. A revised Evaluation Timeline is presented below along with activity status as of December 31, 2021.

As of 12/31/2021, the following activities were completed:

- Revised 2020 Cumulative Interim Report submitted 5/13/21.
- Waves 2 and 3 Enrollee Surveys completed.
- Wave 4 Enrollee Survey initiated.
- Wave 3 TCM Provider Key Informant Interviews completed.
- Updated administrative data through April 30, 2021, obtained and cleaned.
- Saginaw County identified as the comparison community and administrative data from May 1, 2013 – April 30, 2021, obtained and cleaned.

Table 5: Revised Timeline for Evaluation Activities

Revised Time Period	Activities	Status *(as of 12/31/21)*
Eval Contract Year 1: 1/1/2018 – 9/30/2018	• Identify key contacts for targeted data sources	• Completed
	• Participate with Flint Registry Advisory Committee	• Ongoing
	• Draft enrollee survey	• Completed
	• Implement Wave 1 enrollee survey (~33 months post-enrollment target: December 2018)	• Deferred to Year 2
	• Draft TCM Provider Survey/Key Informant Interview	• Completed
	• Implement Wave 1 TCM Provider Survey/Key Informant Interviews (~34 months post TCM implementation: January 2019)	• Deferred to Year 2
	• Draft community asset inventory tool	• *Eliminated*
	• Program administratively derived measures and report for pre-exposure year (4/1/13 – 3/31/14), year 1 (4/1/14 – 3/31/15) and year 2 (4/1/15 – 3/31/16)	• Completed
	• Assemble and test different methods to generate comparison groups – Saginaw County identified as comparison county	• Completed
	• Identify and test data sources for TCM (needs assessments, plans of care, screenings, referrals, etc.)	• Completed
	• Identify and test data sources and methods for linkage with Department of Education information (will be using publicly reported MI Schools Dashboard data)	• Completed
	• Identify research co-occurring studies and evaluation for possible incorporation into evaluation	• Ongoing
	• Generate quarterly updates	• Ongoing
Eval Contract Year 2: 10/1/2018 – 9/30/2019	• Implement Wave 1 enrollee survey (*From Year 1:* ~33 months post-enrollment target: December 2018)	• Completed (12/18-4/19)
	• Wave 1 Enrollee survey analysis and report findings	• Completed
	• Implement Wave 2 Enrollee survey to Wave 1 participants (~40 months post-enrollment: Sept 2019 – January 2020)	• Completed
	• Implement Wave 1 TCM Provider Survey/Key Informant Interviews (~ 32 months post TCM implementation: Jan 2019)	• Completed (1/19-4/19)
	• Wave 1 TCM Provider Survey/Key Informant Interviews analysis and report findings	• Completed
	• Ongoing community asset inventory surveillance	• *Eliminated*
	• Ongoing monitoring of community-based co-occurring studies and evaluation for possible incorporation into evaluation	• *Eliminated*
	• Run TCM measures and conduct data analysis for timeframe 5/1/16 – 4/30/17 (year 1 delivery)	• Completed
	• Run annual administrative measures and conduct analysis and trending for timeframe 5/1/16 – 4/30/17	• Completed
	• Monitor increase in enrollment and services for cost evaluation for timeframe(s)	• Completed
	• *Drafted and implemented Key Informant Interview for Administrative Cost Summarization (Added to Year 2)*	• *Deferred to Year 3*
	• *Administrative Cost Key Informant Interview analysis and report findings (Added to Year 2)*	• *Deferred to Year 3*

Revised Time Period	Activities	Status *(as of 12/31/21)*
	• Assemble and test different methods to generate comparison groups (*From Year 1)*- – Saginaw County identified as comparison county	• Completed
	• Generate quarterly updates	• Ongoing
	• Generate interim annual report (Calendar Year 2018)	• Completed
Eval Contract Year 3: 10/1/2019 – 9/30/2020	• Drafted and implemented Key Informant Interview for Administrative Cost Summarization	• Completed
	• Administrative Cost Key Informant Interview analysis and report findings	• Completed
	• Implement Wave 2 (Follow-Up) TCM Provider Survey/Key Informant Interviews (~42 months post TCM implementation: Jan 2020)	• Completed
	• Research and report potential commercial comparison group estimates for expanded financial limit cohort	• *Eliminated*
	• Continue Wave 2 (Follow-Up) Enrollee survey (~39 months post-enrollment: Sept 2019 – March 2020)	• Completed
	• Wave 2 Enrollee survey analysis	• Completed
	• Wave 2 TCM Provider Survey/Key Informant Interviews analysis	• Completed
	• Implement Wave 3 (Follow-Up) Enrollee survey (~48 months post-enrollment: June 2020)	• Completed
	• Ongoing community inventory surveillance	• *Eliminated*
	• Ongoing monitoring of community-based co-occurring studies and evaluation for possible incorporation into evaluation	• *Eliminated*
	• Run TCM measures and conduct data analysis for timeframe 5/1/17 – 4/30/19	• Completed
	• Run annual administrative measures and conduct data analysis/trending for timeframe 5/1/17 – 4/30/19	• Completed
	• Monitor change in enrollment and services for cost evaluation (From Year 2)	• Completed
	• Generate quarterly updates	• Ongoing
	• Generate cumulative, interim evaluation report (Calendar Years 2018-2019)	• Completed
Eval Contract Year 4a: 10/1/2020 – 4/30/2021	• Continue Wave 3 Enrollee survey (~48 months post-enrollment: Sept 2020-Feb 2021)	• Completed
	• Summarize Wave 1 – Wave 3 Enrollee Survey analysis and report findings	• Completed
	• Summarize Wave 1 – Wave 2 TCM Provider Survey/Key Informant Interviews and report findings	• Completed
	• Ongoing community inventory surveillance	• *Eliminated*
	• Ongoing monitoring of community-based co-occurring studies and evaluation for possible incorporation into evaluation	• *Eliminated*
	• Run TCM measures and conduct data analysis for timeframe 5/1/18 – 4/30/19 and 5/1/19 - 4/30/20	• Completed
	• Run annual administrative measures and conduct data analysis/trending for timeframe 5/1/18 – 4/30/19 and 5/1/19 - 4/30/20	• Completed

Revised Time Period	Activities	Status *(as of 12/31/21)*
	• Monitor increase in enrollment and services for cost evaluation • Generate quarterly updates • Generate 2020 annual report	• Pending • Ongoing • Completed
Eval Contract Year 4b (NCE): 5/1/2021 – 9/30/21	• Run TCM measures and conduct data analysis for timeframe 5/1/20 – 4/30/21 • Run annual administrative measures and conduct data analysis/trending for timeframe 5/1/20 – 4/30/21 • Generate quarterly updates • Generate final evaluation report (10/31/2022)	• Completed • Completed • Ongoing • Deferred to October 2022
Eval Contract Year 5 (NCE): 10/1/2021 – 9/30/22	• Implement Wave 4 Enrollee survey • Summarize Wave 1 – Wave 4 Enrollee Survey analysis and report findings • Summarize Wave 1 – Wave 3 TCM Provider Survey/Key Informant Interviews and report findings • Run TCM measures and conduct data analysis for timeframe through 4/30/2022 • Run annual administrative measures and conduct data analysis/trending for timeframe through 4/30/22 • Generate quarterly updates • Generate 2021 annual report • Generate Final Evaluation Report (October 2022)	• Ongoing • Ongoing • Ongoing • Ongoing • Ongoing • Ongoing • Completed • Pending

The FME Waiver received a temporary one-year extension through February 2022 while the review process was underway for a five vs. ten-year extension. The evaluation has similarly been extended with allowing a sufficient claims run-out period. The full twelve months assigned to the data years will be used for the final report, therefore, an additional data year incorporating services between 5/1/21 – 4/30/22 will be acquired and incorporated. The adjusted deadline for final evaluation report is extended to October 28, 2022.

Methodological Limitations

The major activities in calendar year 2018 included organization of administrative data sources already available to the team as well as planning activities to implement the various surveys needed to supplement the health care claims/encounter data. The evaluation team faced issues early on regarding proposed methods to distinguish Medicaid enrollees potentially eligible for the FME waiver regardless of enrollment as well as how to handle problematic cases (i.e., missing, or incomplete data). The execution of three main surveys, enrollee, TCM Provider and MDHHS waiver staff was a focus during 2019 as well as expanding the scope of the programming needed to report on the measures based on administrative health care data. The enrollee and TCM provider surveys were extended through December 2020 despite the shutdowns associated with the COVID-19 pandemic. Alternative data sources were identified to provide some information on educational measures. The extension granted by CMS allowed the evaluation to implement a Wave 4 enrollee survey during 2021. This along with the opportunity to pull additional utilization data and refine publicly available education data were the focal activities of 2021.

The evaluation team further dealt with the observation that enrollees were more geographically distributed than originally expected. The original assumption was that all potential FME enrollees would come from City of Flint residents. However, lead exposure was based on the Flint Water System delivery network of service lines which did not fully align with the city's geographic boundaries. In addition, at the start of the waiver extension some individuals might have already moved out of the area. This caused the team to adjust the planned approach for acquiring data from the MDHHS Data Warehouse for enrollees and potential comparison groups. The sampling strategy for the enrollee survey also needed adjustment to incorporate a stratified method to accommodate this observation.

Another limitation was the inability to secure a federal Department of Education waiver to permit MDE to share education data at the individual level for linking with health care data. The evaluation team identified other data sources in response to this barrier. The evaluation team reached out to MSU faculty involved with school based public reporting in the Mi Schools Dashboard. These data provide context to the impact of the lead exposure on the educational attainment of students in the community schools however the team will be unable to quantify the impact of the waiver's offerings. The enrollee survey was the final data source designated to obtain education related information. Several questions were designed to inquire about learning and emotional/behavioral problems for the child survey. While self-report is not without limitations, the evaluation team chose to pursue all available options.

The evaluation team also faced the limitation of individualized program data management. Several state-sponsored health related registries are not housed in Medicaid due to their

inclusion of populations outside of Medicaid enrollees. This included both the lead screening and the MCIR data. Separate data access request and approvals were needed to acquire these data elements. As of 2021, the relevant health programs have provided approval to use their data (i.e. lead screening, MCIR). Data sets outside Medicaid (housing, lead investigation) will not be available to support the evaluation.

As the evaluation team began meeting with organizations involved in serving Flint community residents, they became aware of entities involved in FME waiver service delivery beyond what was initially identified. Thus, the evaluation was expanded to include certain data elements such as TCM provider input. Additionally, we encountered timing barriers affecting our plans to implement the enrollee survey. The extended approval and contracting timeframe shortened the original timeline of proposed activities. Shutdowns associated with the COVID-19 pandemic further impacted evaluation activities, particularly with respect to having staff available to process Wave 2 and Wave 3 telephone and mail surveys. A partial return to normal university operations during 2021 provided opportunities to catch up survey entry activity.

The hypotheses as written in the waiver application referenced comparing individuals enrolled in the FME waiver to others with similar blood lead levels. Available data from the state's lead monitoring system documented the proportion having elevated levels overall to be low overall. State reports document lead testing during the year 2020 declined substantially compared to prior years which is attributed to the impact of the government stay-home orders. The evaluation team linked available blood lead values to individuals enrolled in the waiver and found that very few individuals had reported EBLLs as presented in the Comparison Group Considerations section (Table 2, p. 16). Thus, insufficient numbers were available to conduct matching. Unfortunately, blood draws may not accurately reflect the full lead exposure an individual may have over time. Current water testing is showing lead levels below accepted national standards, but the water system still has not yet been deemed "safe" as of January 2022. This designation cannot be granted until all affected (corroded) water service lines have been replaced. Thus, there may be ongoing exposure occurring in the population which is difficult to quantify.

Despite the limitations, elements of the evaluation reflected positive attributes. The implementation of this evaluation project through December 2021 had several strengths. Partnerships and communications with key stakeholders were invaluable in understanding alternatives for data. The approved extension provided an additional year that will be used to contribute some post-pandemic health utilization. We may observe similar rebounding of health services as others have reported nationally. The extension further provided an opportunity to disseminate a fourth wave of the enrollee survey.

Results

Results presented in this annual report reflect findings based on activities between January 2018 through December 2021. The findings are presented by Evaluation Domain and relevant hypotheses. Where available, administrative health care claims or enrollment data as far back as May 2013 was obtained to provide estimates for the baseline year (T1) that reflected the period 12 months prior to the water switch. The following tables have been relabeled to more clearly reflect the three timeframes presented on page 5. Because of the time needed to allow claims processing to occur, the most recent utilization data available for this report ends April 30, 2021.

Comparison Group Considerations

In many of the measures identified for the hypotheses, they were worded in such a manner to propose that FME enrollees will have better access *compared with others with similar levels of lead exposure*. The reference to others reflects on the selection of an appropriate comparison group. However, after linking the lab results of lead testing and the enrollment data, the evaluation team found very few individuals with EBLLs (Table 2, p. 16).

As described in the Target and Comparison Populations section, each of the four original potential comparison populations suffered from limitations. In addition to the limitations described in that section, a common limitation of all included the inability to accurately quantify the level of lead exposure from what is most frequently a one-time blood draw. Due to this issue which the team acknowledged to persist among all the potential comparison groups, a decision was made to focus on a fifth group described as a *comparison group of similar individual and neighborhood characteristics at the census tract level*.

The K-means analysis confirmed that Saginaw County would be a suitable option for Comparison Group 5 (for details see Appendix 8). Upon identification of the comparison community, the MDHHS Data Warehouse was accessed for claims/encounter data for all Medicaid enrollees residing in Saginaw County from May 2013 through April 2021. History of comorbidity and/or similar census-tract level social/economic background were adjusted when appropriate in regression models.

Potentially Eligible Waiver Population Characteristics

The expansion enrollment date was 5/9/2016. Residency in the City of Flint or Genesee County was not required for enrollment into the FME waiver. The State of Michigan became aware that initial methods to identify potentially eligible individuals using a list of seven Flint zip codes (48501, 48502, 48503, 48504, 48505, 48506, 48507) was incomplete when compared to the

City's water service distribution network. Therefore, they added four zip codes (48509, 48519, 48529, 48532) representing areas that existed outside of the City of Flint's geographic boundaries yet were exposed to the affected water. This complete list of eleven zip codes represented the Flint Water Service Area (FWSA) and was used to identify potentially eligible individuals. The eleven zip codes were all contained within the geographic boundaries of Genesee County.

The evaluation team also noted potentially eligible individuals relocating to other geographic areas since the water crisis. Based on data contained in enrollment records, individuals relocated since the water switch outside of the FWSA and even outside of Genesee County to elsewhere in the state. We could not identify all potentially eligible individuals who relocated outside Genesee County using zip codes and thus we used the FME Waiver benefit plan enrollment indicator to identify those who relocated. We theorized that individuals who relocated may have had different levels of resources than those who remained in the same location.

We initially employed a two-step method to independently construct the population of eligible individuals. The first step was to assign a flag to indicate potential eligibility using available general Medicaid enrollment files each year. Individuals did not have to meet any continuous enrollment criteria. We coupled this information with Modified Adjusted Gross Income (MAGI) information collected during the Medicaid determination process to confirm individuals would qualify per the FPL limitations. We did not believe that all of Genesee County would be eligible and initially selected these individuals with the interest in exploring their ability to serve as a comparison group.

However, enrollment in the FME Waiver did not require residential history at one of the eleven zip codes served by the Flint Water System. Individuals would be eligible to enroll if they could document exposure to the water source despite living outside the FWSA. This determination could not be made using existing administrative data. In fact, the evaluation team identified individuals enrolled in the FME Waiver through administrative data that had no history of having lived at one of the eleven zip codes or even in Genesee County. This could occur when an individual resided outside the geographic boundaries but attended school, work, or spent time in the eleven zip codes FWSA. Individuals meeting the requirement for documented exposure without geographic residence formed a second group of eligible individuals. The decision was to classify these individuals as eligible since they were in fact, already enrolled. Specifically, they had the appropriate FME Waiver benefit plan identifier assigned by Michigan Medicaid.

The ability to qualify for FME without requiring residence in the FWSA means the evaluation team was unable to determine the true number of potentially eligible individuals that may have been exposed to the water but never applied to the State of Michigan for the waiver based

Medicaid coverage. This limitation would be expected to have a greater impact on the ability to determine the FME Waiver's impact on those who were at the increased FPL thresholds. Individuals at these higher levels may have history trying to access Medicaid coverage in the past and been denied due to income. Despite the public information campaigns of the expanded coverage options, these individuals may have assumed they would still be denied. Another factor potentially impacting enrollment for those at higher FPL may be that individuals at the higher levels were not interested in Medicaid coverage through the waiver for a variety of reasons including having other forms of insurance and/or perceived stigma of being enrolled in Medicaid.

After assembling the potential pool of eligible persons, the evaluation team identified individuals officially enrolled in the waiver using a combination of MAGI and Medicaid Benefit Plan codes available through the MDHHS Health Services Data Warehouse. Enrollees were initially identified by a MAGI code beginning with "F" along with a current benefit plan of "TCMF". This process was modified over time to solely rely on MAGI code as the overlap between the two identifiers exceeded 98%. Pregnant women eligible and enrolled in the Waiver were identified through a combination of eligible MAGI codes along with Medicaid Scope and Coverage codes and claims related to live births. The prenatal care related claims with a birth record combination were found to be the most accurate method to identify pregnant women. These coding algorithms were reviewed with MDHHS colleagues for accuracy.

A second method to identify the potentially eligible population was implemented using the FWSA as the target eligible population. This was done to identify more accurately those who were likely exposed to the contaminated water without consideration of inclusion as a possible control group member. Table 7 reflects the enrollment that might be expected based on the estimates of people that could be specifically tied to the target eleven zip codes included in the FWSA. As expected, the potential denominator decreased from the county-wide area estimate (n=125,480) to the eleven-zip code area estimate (n=79,039). FME enrollment based on the eleven-zip code area is approximately 38% (29,939/79,094). However, we observed enrollment of individuals that we could not link to the target eleven zip codes so total enrollment for the first year was 33,528. Despite being unable to link these additional individuals to residence in the eleven zip codes, we documented the bulk of waiver enrollment, nearly 89% (29,939/33,528) came from the FWSA. Those not in the target zip codes may have differential access to other, non-Medicaid community formal and informal supports. Sub-group analyses will attempt to quantify differences in outcome measures for these two categories of enrollees (in FWSA vs. out of FWSA).

Table 7 further describes the socio-demographic characteristics of the potentially eligible cohorts, those in Genesee County, those residing in the FWSA and those who enrolled in the FME waiver. Minimal variation was observed between the two timeframes (pre-post FME start)

for population characteristics of the potentially eligible cohort residing in Genesee County. As we restricted to the FWSA geographic region which included the City of Flint, little variation was noted among the age and gender proportions. However, the proportion of non-Hispanic, African American enrollees identified as potentially eligible increased more than 10 percentage points with a corresponding decrease noted in the number of non-Hispanic, White enrollees. This observation was consistent with the racial make-up of the City of Flint.

Table 7: Population characteristics of Potentially Eligible before and after May 1, 2016, corresponding to T2 and T3.

	Medicaid Eligible in Genesee County plus Statewide FME Waiver Enrollees		Medicaid Eligible in Eleven Zip Code FWSA		FME Waiver Enrollees (5/1/16 – 4/30/17)	
	T2: Post Water Switch and Pre FME Waiver 5/1/15—4/30/16	T3: Post Water Switch and Post FME Waiver 5/1/16—4/30/17	T2: Post Water Switch and Pre FME Waiver 5/1/15—4/3/16	T3: Post Water Switch and Post FME Waiver 5/1/16—4/30/17	T3: Total	T3: FWSA Subgroup
Count of unique Medicaid enrollees	N=126,486	N=125,480	N=80,351	N=79,094	N=33,528	N=29,939
Age (Years, as of October 1 of each year)						
0-6	21.8%	22.1%	22.6%	22.6%	39.8%	39.5%
7-16	24.9%	25.0%	24.2%	24.5%	41.2%	41.7%
17-21	11.5%	11.4%	11.5%	11.1%	14.9%	14.7%
22-64	38.3%	37.9%	38.6%	38.7%	4.1% (22+)*	4.0%
65+	3.5%	3.6%	3.1%	3.2%		n/a
Gender						
Male	29.4%	29.4%	29.3%	29.2%	47.9%	48.2%
Female	70.6%	70.6%	70.7%	70.8%	52.1%	51.8%
Race/Ethnicity						
non-Hispanic white	54.6%	54.3%	42.4%	42.4%	30.9%	28.5%
non-Hispanic black	34.4%	34.7%	47.3%	47.4%	59.0%	61.7%
Hispanic/Other	4.3%	4.4%	4.3%	4.3%	4.7%	4.6%
Unknown	6.7%	6.5%	6.0%	5.9%	5.4%	5.2%
Residence Category						
Always Genesee County	99.9%	97.6%	100.0%	98.5%	91.0%	96.1%
Partial Genesee County	0.0%	1.1%	0.0%	1.5%	3.9%	3.9%
Never Genesee County	0.0%	1.4%	0.0%	0.0%	5.1%	0.1%
FME Waiver Enrollment						
Proportion having any FME enrollment	n/a	26.7%	n/a	37.9%	100%	100%
Pregnancy Indicator	2.6%	3.2%	2.8%	3.4%	4.9%	4.8%
Federal Poverty Level Category (% FPL)						
FPL 0 - 99%	81.5%	79.6%	83.9%	81.4%	76.6%	77.1%
FPL 100 - 199%	17.3%	18.7%	15.2%	17.0%	19.8%	19.5%
FPL 200 - 299%	1.2%	1.5%	0.9%	1.3%	2.9%	2.8%
FPL 300% +	0.1%	0.2%	0.1%	0.3%	0.7%	0.7%

**Categories collapsed due to small cell sizes*

FME Waiver Enrollment

Table 8 displays the change in socio-demographic characteristics among those who were enrolled in the FME waiver regardless of residence since the start of the FME waiver from May 2016 to April 2021. An increasing number of enrollees in FME now reside outside Genesee County. The observation of a decline in overall enrollment since waiver approval confirmed the pattern anticipated by Medical Services Administration (MSA) informants. The waiver authorized individuals at higher FPL to qualify for the benefit and for those exceeding the 400% threshold, to buy into the program to secure access to TCM. The use by individuals at income thresholds over 200% FPL continues to be small, less than 5%.

Over the five years, a total of 44,649 unique enrollees had at least one FME enrollment month, among whom 21,044 (47%) enrolled for all five years. The numbers of new beneficiaries (i.e., those who did not have any Medicaid eligible month before they enrolled in FME) enrolled in FME are 3282, 1424, 1106, 1129, and 1058 in the five years of the program. Approximately 4% (n=1,582) of unique enrollees (including 524 existing and 1058 new Medicaid beneficiaries) newly enrolled during the 2020/2021 timeframe.

Table 8: Total Medicaid statewide FME waiver enrollees from May 1, 2016, to April 30, 2021

	FME Waiver Enrollee (T3: 5/1/16-4/30/17)	FME Waiver Enrollee (T3: 5/1/17-4/30/18)	FME Waiver Enrollee (T3: 5/1/18-4/30/19)	FME Waiver Enrollee (T3: 5/1/19-4/30/20)	FME Waiver Enrollee (T3: 5/1/20-4/30/21)
Count of unique Medicaid enrollees	N=33,528	N=33,917	N=31,850	N=30,996	N=28,891
Age (Years, as of October 1 of each year)					
0-6	39.8%	38.0%	35.4%	32.7%	29.4%
7-16	41.2%	42.6%	45.6%	47.8%	50.8%
17-21	14.9%	16.1%	16.3%	16.7%	17.2%
22+	4.1%	3.3%	2.8%	2.9%	2.5%
Gender					
Male	47.9%	48.6%	49.1%	49.0%	49.5%
Female	52.1%	51.4%	50.9%	51.0%	50.5%
Race/Ethnicity					
non-Hispanic white	30.9%	31.9%	32.4%	32.2%	34.7%
non-Hispanic black	59.0%	58.0%	57.4%	56.8%	59.1%
Hispanic/Other	4.7%	4.6%	4.6%	4.6%	2.4%
Unknown	5.4%	5.5%	5.7%	6.3%	3.8%
Residence Category					
Always Genesee County	91.0%	88.6%	87.4%	86.4%	86.2%
Partial Genesee County	3.9%	4.0%	3.5%	3.5%	2.7%
Never Genesee County	5.1%	7.3%	9.0%	10.1%	11.1%
Federal Poverty Level Category (% FPL)					
FPL 0 - 99%	76.6%	75.3%	74.6%	76.1%	79.8%
FPL 100 - 199%	19.8%	20.3%	20.6%	18.9%	15.5%
FPL 200 - 299%	2.9%	3.4%	3.7%	3.9%	3.5%
FPL 300% +	0.7%	0.9%	1.1%	1.2%	1.2%

Domain 1: Access to Care

The main hypothesis for Domain 1 focused on Access to Care. The target comparison group was adjusted to non-enrollees having similar individual and neighborhood characteristics. Nine specific sub-hypotheses were identified to provide measures of access for both targeted populations, children, and pregnant women. Sub-hypotheses 1.1 through 1.5 were chosen for their applicability to a pediatric population while items 1.5, 1.6 and 1.7 were relevant for pregnant women. These seven sub-hypotheses used administrative health care claims for evaluation. Information was calculated for the T1 pre-water switch timeframe (May 2013 – April 2014) through the most recent completed available data year (May 2018 – April 2021). The last two sub-hypotheses acquired the necessary data through the enrollee survey process.

Sub-hypotheses 1.1: Improved Access to Care

1.1: *A greater proportion of enrollees will obtain age-appropriate well-child exams than non-enrollees with similar individual and neighborhood characteristics.*

The Well-Child Check HEDIS Measure was defined in terms of three age groups. The first metric included the percentage of children 15 months old who had at least one well-child visit with a PCP during their first 15 months of life. The second metric focused on children 3-6 years of age having a well-child visit during the year. The last metric reported on adolescents from 12-21 years of age.

Table 9 reflects the proportion of children continuously covered by Medicaid who received at least one well-child check. The evaluation team restricted to children that were continuously enrolled in Medicaid during the appropriate reporting period to ensure that complete claims/encounter data was available through the Medicaid Health Services Data Warehouse when assessing service use. An enrollee who was flagged as being enrolled in FME for at least one month during the continuous period was classified as an FME enrollee for the full reporting period.

Imposing the requirement for continuous Medicaid enrollment retained a majority (>70%) of all enrollees for all three age groups. When the team compared the reporting rates between those who were ever enrolled (i.e., not continuously enrolled) with those who were continuously enrolled, the results were within approximately five percentage points with the “ever enrolled” consistently being lower. This was not unexpected as there would be no way to document health services delivered and paid for by other insurance or programs during periods of Medicaid ineligibility. To compare with those who did not have any FME enrollment in either the Genesee or Saginaw County in the lower part of the panel for each outcome, we used regression-based methods to test for the trends of the outcome between FME enrollees and their comparison, controlling for child sex, race, and, when possible, census-tract level socioeconomic and environmental factors (see Appendix 7 regarding the tests performed for the hypotheses). However, in the 2020-2021 period, there are too many missing values for the

census-tract codes in both the FME group and the Comparison group (% missing values differed for different outcomes, but they were sizable; thus, we do not report p-values in Table 9).

There was no differential yearly effect between the FME and Comparison in having any well-child visit in the first 15 months of life during the 5/2016 to 4/2021 period (p=0.567). There was a decrease in the total number of children in the first 15 months of life in the FME group in the last two years, which was not seen in the Comparison group.

Both the FME and Comparison groups had decreases in children at age 3, 4, 5, and 6 having any well-child visits in the two years 2019-2021, although the FME group had higher rate in 2019-2020 than the Comparison but lower rate in 2020-2021. For adolescents, again both groups had decreases in the two years 2019-2021, although the FME group had higher rate in 2019-2020 than the Comparison but lower rate in 2020-2021. The decreases in well-child visits in children 3 to 6 and in adolescents may be more impacted by the COVID pandemic than the younger age group.

Table 9. H1.1: Well-Child Visits by Age Groups: 5/1/2013 – 4/30/21

	T1: 5/1/13—4/30/14	T2: 5/1/14—4/30/15	T2: 5/1/15—4/30/16	T3: 5/1/16—4/30/17	T3: 5/1/17—4/30/18	T3: 5/1/18—4/30/19	T3: 5/1/19—4/30/20	T3: 5/1/20—4/30/21
Well-Child Visits in the First 15 Months of Life								
Had any visits				**FME Enrollees**				
	N=4328	N=4274	N=3617	N=1072	N=1538	N=887	N=483	N=551
	2781 (64.3%)	4072 (95.3%)	3483 (96.3%)	1046 (97.6%)	1500 (97.5%)	867 (97.7%)	473 (97.9%)	517 (93.8%)
				Comparison Group				
				N=2595	N=2447	N=3025	N=3287	N=3545
				2478 (95.5%)	2344 (95.8%)	2907 (96.1%)	3136 (95.4%)	3268 (92.2%)
Well-Child Visits at Age 3, 4, 5, and 6 Years								
Had any visits				**FME Enrollees**				
	N=16143	N=15413	N=14714	N=5736	N=6280	N=6158	N=5934	N=5399
	11978 (74.2%)	11413 (74.0%)	10484 (71.3%)	4059 (70.8%)	4554 (72.5%)	4453 (72.3%)	4102 (69.1%)	3094 (57.3%)
				Comparison Group				
				N=9538	N=9464	N=9613	N=9514	N=11984
				6590 (69.1%)	6672 (70.5%)	6766 (70.4%)	4759 (50.0%)	7477 (62.4%)
Adolescent Well-Care Visits Age 12 -21 years.								
Had any visits				**FME Enrollees**				
	N=29090	N=30122	N=28931	N=9010	N=10015	N=10051	N=10074	N=11648
	11458 (39.4%)	12120 (40.2%)	12068 (41.7%)	3736 (41.5%)	4141 (41.3%)	4252 (42.3%)	3895 (38.7%)	3856 (33.1%)
				Comparison Group				
				N=20620	N=20479	N=20924	N=20975	N=25409
				8580 (41.6%)	8797 (43.0%)	8867 (42.4%)	6203 (29.6%)	9145 (36.0%)

Sub-hypotheses 1.2: Improved Access to Care

1.2: *A greater proportion of enrollees will receive age-appropriate developmental screening/assessments than non-enrollees with similar individual and neighborhood characteristics.*

This hypothesis is based on the percentage of children screened for risk of developmental, behavioral, and social delays using a standardized screening tool (CPT 96110) in the first three years of life.

It is known that lead is a neurotoxin and that children exposed to high levels of lead may experience poor developmental and behavioral health. Thus, developmental, and behavioral screening is necessary to assess problems early for timely treatment to mitigate poor outcomes. Thus, to address sub-hypotheses 1.2, observed rates based on administrative claims data for any number of developmental and behavioral screening visits in the first three years of life are presented in Table 10. As with 1.1, rates reported are based on continuous enrollment in Medicaid during the 12-month reporting periods from 5/1/2013 to 4/30/2021 for children aged 1, 2 or 3 years old.

For 2013-2014, before the water crisis, 12% of children had developmental screening visits. As with the limitation of the 0-15 month well child visit rate, just 12 months of historical administrative data was obtained. Thus, we believe these rates to be adversely impacted by missing data extending further back to 2012. This rate increased to 28% during the first year of the water crisis, 2014 – 2015 and 33% in 2015-2016 before the waiver was administered. The proportion having at least one developmental screening visit for those enrolled in the waiver continues to increase over time, with the highest level at 48% in 2019-2020. The proportion drops to 40% in 2020-2021. This may be an artifact of the impact of the pandemic upon access to care. In the post-expansion period, the comparison group had stable rates (between 40 and 44%). We used random-effect logistic regression to compare the trends of the outcome between FME enrollees and their comparison, controlling for child sex and race (due to the missing value in the census-tract codes in the last year the level socioeconomic and environmental factors are excluded). Likelihood ratio test for differential yearly effects between FME and Comparison using data from 5/2016-4/2021 had $p<0.05$, suggesting jointly significantly different rates across the five years. The FME group had statistically higher rates in years 3, 4 and 5.

Table 10. Developmental/Behavioral Screening visits in the First Three Years of Life: 5/1/2013-4/30/2021

	T1: 5/1/2013—4/30/2014	T2: 5/1/2014—4/30/2015	T2: 5/1/2015—4/30/2016	T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
Had any visits	N=13565	N=12466	N=12202	**FME Enrollees**				
	1573 (11.6%)	3469 (27.8%)	4007 (32.8%)	N=4323	N=4846	N=3709	N=2673	N=1626
				1501 (34.7%)	1886 (38.9%)	1660 (44.8%)	1276 (47.7%)	654 (40.2%)
				Comparison Group				
				N=7497	N=7698	N=8601	N=9598	N=10368
				2996 (40.0%)	3323 (43.2%)	3812 (44.3%)	3930 (40.9%)	4071 (39.3%)

Sub-hypotheses 1.3: Improved Access to Care

1.3: A greater proportion of enrollees will receive age-appropriate lead testing compared to non-enrollees with similar individual and neighborhood characteristics.

For this hypothesis, we focused on the HEDIS metric "the percentage of children 6 years old who had 1 or more capillary or venous lead blood test for lead poisoning by their second birthday." We used both claims' data and lab data to identify who had a lead test. Examining lead screening using administrative claims and lab data for children continuously enrolled for the twelve-month reporting period from 5/1/2013-4/30/2021 showed steady increases from 5/2016 to 4/2019; however, the data in 2019-2020 are not complete and the rates in 2020-2021 are low due to the impact of the pandemic. The evaluation team is confirming the lead lab data reporting cycles.

As is seen in Table 11, in 2013-2014 reported claims and labs revealed a lead screening rate of 25%. In the year of the water crisis, 2014-2015, screening jumped to 42% and 58% in 2015-2016. Screening in the first year of the waiver implementation (2016-2017) was more than 72% for waiver enrolled children as well as the comparison. The rates for children in the waiver increased to 78% whereas 76% of the comparison children were tested in 2018-2019. The 2019-2020 data are suppressed. In 2020-2021, the testing rate is 61% for waiver enrolled children, while the comparison children reach 53% testing rate. Due to the missing data and pandemic impact, we did not perform statistical tests for this hypothesis.

Table 11. Lead Screening in Children Aged 2 Using Claims or Lab Data. 5/1/2013-4/30/21.

	T1: 5/1/2013—4/30/2014	T2: 5/1/2014—4/30/2015	T2: 5/1/2015—4/30/2016	T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
Had any BLL testing (N, %)	N=22387	N=20316	N=19715	**FME Enrollees**				
	5683 (25.4%)	8514 (41.9%)	11412 (57.9%)	N=7015	N=8055	N=6846	DQI*	N=4606
				5067 (72.2%)	6174 (76.6%)	5340 (78.0%)	DQI	2806 (60.9%)
				Comparison Group				
				N=12180	N=12344	N=13350	DQI	N=15670
				8931 (73.3%)	9631 (78.0%)	10174 (76.2%)	DQI	8367 (53.4%)

*DQI (data quality issue) for 5/2019—4/2020 and the counts are suppressed at this time while the evaluation team investigates questions regarding data completeness.

Sub-hypotheses 1.4: Improved Access to Care

1.4: A greater proportion of enrollees with high blood lead levels will receive re-testing at the appropriate intervals compared to non-enrollees with similar individual and neighborhood characteristics.

For some children, blood lead levels can be elevated and given the recent elevated lead content in Flint supplied water re-testing for those children is critical. Children documented with elevated blood lead values need to be re-tested to monitor impacts of treatment. We followed the CDC guideline for recommended time frame for re-test based on the blood lead level in the first test.

In 2013-2014, blood lead level re-testing was 9.2% before the water crisis and 13% to 19% during the two years of water crisis (Table 12). For the first two years the waiver was implemented, 31% for enrollees needing to be re-tested were re-tested. Rates were increased in 2018-19 to 36% and remained similar in 2019-2020. In the same time periods, the re-testing rates in the comparison children fluctuated between 24% and 31%. The blood lead level re-testing sample size for children with EBLL was low in 2020-2021, we suppressed the numbers in the table cells.

Thus, we only compared the trend in the first four years of the waiver expansion for the FME enrollees against the trend for the Comparison. Although the FME group had higher rates in years 1-4, the difference was not statistically significant.

Table 12. Blood lead level re-testing with children with EBLL, 5/1/2013-4/30/21.

	T1: 5/1/2013—4/30/2014	T2: 5/1/2014—4/30/2015	T2: 5/1/2015—4/30/2016	T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
Had any blood lead level retesting (N, %)**	N=412	N=459	N=561	**FME Enrollees**				
	38 (9.2%)	61 (13.3%)	109 (19.4%)	N=278	N=181	N=116	N=65	N=8
				85 (30.6%)	56 (30.9%)	42 (36.2%)	23 (35.4%)	**
				Comparison Group				
				N=208	N=204	N=207	N=188	N=22
				60 (28.8%)	49 (24.0%)	58 (28.0%)	59 (31.4%)	**

** Cells less than or equal to 5 are suppressed

Sub-hypotheses 1.5: Improved Access to Care

1.5: *Enrollees who are pregnant will have timelier prenatal and postpartum care compared to non-enrollees with similar individual and neighborhood characteristics*.

Prenatal and postpartum care is essential especially during environmental crises whereby the mother and baby may be at physical (lead exposure, miscarriage) and behavioral risks (toxic stress, postpartum depression). To address sub-hypothesis 1.5 claims data was examined to assess timeliness of prenatal care according to accepted HEDIS specifications (e.g., percentage of deliveries that received a prenatal care visit in the first trimester, on the enrollment start date or within 42 days of enrollment in the organization). HEDIS specifications for identifying prenatal and postpartum care require the practitioner type to be "an OB/GYN or other prenatal care practitioner or PCP". At times, the administrative claims data does not fully document the billing and rendering provider information.

The evaluation team compared three algorithms for identifying prenatal and postpartum care. In algorithm #1, we used only the procedure (CPT) and diagnosis (DX) codes related to prenatal care (bundled to stand alone visits); in algorithm #2, we considered either the CPT/DX codes or the provider taxonomy codes to capture the most records; and in algorithm #3, we used both the CPT/DX codes and the provider taxonomy codes, which apply the most stringent criteria, but are subject to missing provider information. The first two algorithms led to similar results and the last algorithm resulted in under estimation of the proportions. Thus, we reported only the results based on algorithm #2. The HEDIS specifications for the prenatal care require counting the enrollment acutely to days. Because the administrative enrollment data do not have the exact date the women became eligible, the team operated under the assumption that enrollment begins on 15th of the month for all women.

Table 13 shows that although there was a steady decline in the number of births, the proportion of timely prenatal and postpartum care remained relatively high. Because of the look-back period required for these perinatal care measures, T2 does reflect to some degree T1 activity. Claims data prior to 5/1/13 were not acquired so a separate reporting of T1 is not available. Likelihood ratio test for differential yearly effects between FME and Comparison in prenatal care using data from 5/2016-4/2021 had p=0.023 using nested logistic regressions adjusting for race and age. FME and Comparison had jointly significantly different rates across the five years. The FME group had statistically higher rate in prenatal care in year 4. Likelihood ratio test for differential yearly effects in postpartum care between FME and Comparison using data from 5/2016-4/2021 had p=0.692 using nested logistic regressions adjusting for race and age. FME and Comparison did not have jointly significantly different rates across the five years.

Table 13. Timeliness of Prenatal Care 5/1/2014 - 4/30/21

	T2: 5/1/2014—4/30/2015	**T2: 5/1/2015—4/30/2016**	**T3: 5/1/2016—4/30/2017**	**T3: 5/1/2017—4/30/2018**	**T3: 5/1/2018—4/30/2019**	**T3: 5/1/2019—4/30/2020**	**T3: 5/1/2020—4/30/2021**
Prenatal Care							
Had prenatal care visit (N, %)	N= 4007	N= 3640	**FME Enrollees**				
	2945 (73.5%)	2812 (77.3%)	N= 1003	N= 777	N= 535	N= 431	N=176
			768 (76.6%)	594 (76.4%)	425 (79.4%)	325 (75.4%)	121 (68.8%)
			Comparison Group				
			N= 2511	N= 2638	N= 2697	N= 1715	N=1026
			1901 (75.7%)	2049 (77.7%)	2079 (77.1%)	1222 (71.3%)	666 (64.9%)
Postpartum Care							
Had post-partum care visit (N, %)	N=4007	N=3640	**FME Enrollees**				
	1970 (49.2%)	1960 (53.8%)	N=1003	N=777	N=535	N=431	N=176
			511 (50.9%)	344 (44.3%)	228 (42.6%)	176 (40.8%)	70 (39.8%)
			Comparison Group				
			N=2511	N=2638	N=2697	N=1715	N=1026
			1454 (57.9%)	1337 (50.7%)	1354 (50.2%)	802 (46.8%)	533 (51.9%)

Sub-hypotheses 1.6: Improved Access to Care

1.6: *A greater proportion of enrollees who are pregnant will have recommended lead testing compared to non-enrollees with similar individual and neighborhood characteristics*.

Lead screening for pregnant women is important to mitigate adverse birth outcomes associated with the exposure to high levels. This sub-hypothesis reported lead screening in pregnant women having a live birth.

Prior to the water crisis, 5/1/2013-4/30/2014, very few data points were identified as evidence for this screening (Table 14). However, in 2015-2016, during the time when pregnant women were mostly likely exposed to lead and the crisis was public, lead screening increased to 8.6% of the Medicaid continuously enrolled beneficiaries. These rates continued to increase even higher for women continuously enrolled in the FME waiver, up to 78% in 5/2017-4/2018; whereas in the Comparison group the rates only increased to 44% in the same year. In the 5/2019-4/2020 period, the rates decreased in the FME waiver enrollees to 60% whereas the Comparison group rate remained close to 45%. In the last year of the evaluation, both groups had a drop in the number of denominators due to decreases in pregnancy rates and the lead screening rates dropped to about half of the rates before. Due to these issues, no statistical tests were performed for the test of trends.

Table 14. Lead Screening in Pregnant Women with Live Birth Using Claims and Lab Data, 5/1/2013-4/30/21

	T1: 5/1/2013 — 4/30/2014	T2: 5/1/2014 — 4/30/2015	T2: 5/1/2015 — 4/30/2016	T3: 5/1/2016 — 4/30/2017	T3: 5/1/2017 — 4/30/2018	T3: 5/1/2018 — 4/30/2019	T3: 5/1/2019 — 4/30/2020	T3: 5/1/2020 — 4/30/2021
Had any BLL testing* (N, %)	N=4684	N=4552	N=4178	**FME Enrollees**				
	7 (0.1%)	11 (0.2%)	358 (8.6%)	N=1117	N=885	N=632	N=570	N=225
				858 (76.8%)	686 (77.5%)	482 (76.3%)	343 (60.2%)	77 (34.2%)
				Comparison Group				
				N=2888	N=3054	N=3071	N=2371	N=1293
				981 (34.0%)	1199 (39.3%)	1347 (43.9%)	1056 (44.5%)	259 (20.0%)

*Due to additional requirements for prenatal and postpartum care measures, the sample sizes in Tables 13 and 14 are slightly different.

Sub-hypotheses 1.7: Improved Access to Care

1.7: *A greater proportion of enrollees will participate with home visiting services compared to non-enrollees with similar individual and neighborhood characteristics*.

In Michigan, enhanced prenatal services are available through a home visiting service called the Maternal Infant Health Program (MIHP). This program is intended to address high risk pregnancies with an increase of specialized services. The program may also offer transportation and birthing classes along with professional visits. Since the interest in this measure was to evaluate active

program engagement, the team restricted on professional visits. Administrative health care data assessing for MIHP services was reviewed.

Prior to the water crisis, 28% of live births showed evidence of MIHP participation. This rate was essentially unchanged during the two years of the initial water crisis. Waiver enrollees appeared to have a slight increase in participation followed by a downward trend. Reasons for this decline are not well-understood. Outreach to the MIHP program staff identified similar declines statewide for MIHP participation over the same timeframe. Within Genesee County, anecdotal reports identified increased availability of other home visiting programs after the water crisis. During the same period after 5/2016, the participation rates in the Comparison group were much lower than that in the waiver group.

We compared the trend for the FME enrollees against the trend for the Comparison group using two nested logistic regressions adjusting for race and age. The likelihood ratio test for differential yearly effect between FME and Comparison using data from 5/2016-4/2021 had p=0.276, suggesting that the FME and Comparison did not have jointly significantly different rates across the five years. The FME group had statistically similar rates in years 1 to 4 (Table 15).

Table 15. MIHP participation with Medicaid deliveries of live births (5/1/2013-4/30/2021).

	T1: 5/1/2013—4/30/2014	T2: 5/1/2014—4/30/2015	T2: 5/1/2015—4/30/2016	T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
Had any MIHP visit N (%)	N=4663	N=4540	N=4170	**FME Enrollees**				
	1290 (27.7%)	1270 (28.0%)	1229 (29.5%)	N=1114	N=884	N=631	N=570	N=225
				356 (32.0%)	255 (28.9%)	166 (26.3%)	156 (27.4%)	52 (23.1%)
				Comparison Group				
				N=2884	N=3047	N=3070	N=2372	N=1293
				755 (26.2%)	686 (22.5%)	678 (22.1%)	456 (19.2%)	296 (22.9%)

Sub-hypotheses 1.8: Improved Access to Care

The enrollee survey was the primary vehicle to obtain data regarding enrollee rating of the success of the waiver in improving their health care as specified in sub-hypotheses 1.8 and 1.9.

1.8: *Enrollees will attest to improved access to health care as a result of the expanded coverage.*

Enrollee Survey Response Rates

Wave 1 results can be considered baseline results. Of the 11,452 surveys that were sent out in four batches, 2614 or 22.8% of participants responded. The association between mailing batch and rate of survey response was not statistically significant (p=0.07). Since there was no batch

effect for mode of response, all batches were combined to create a single cohort of participants. Of the 2614 who returned the Wave 1 survey, 2388 (91.4%) were children and 226 (8.7%) were adults.

The notification process for Waves 2, 3, and 4 was electronic reminders with embedded survey links for the participants who had completed Wave 1 via the online survey. If no response to the electronic notification occurred, these individuals received the paper mailing invitation following the same protocol devised for Wave 1. Table 16 displays the survey response rates for Waves 1 through 3. Wave 4 was initiated during the fourth quarter of 2021 after the extension was granted. Data from this wave will be incorporated into the final evaluation report. The response rate for Wave 1 was somewhat disappointing at less than 25% however more than 2/3 of those that originally participated remained engaged and submitted Wave 2 responses. Of those that participated in Wave 2 Child survey, over 74% submitted responses to the Wave 3 survey.

Table 16: Response Rates for Waves 1 through 3

Respondent Pool (N)	Wave 1 Responses (Response %)	Wave 2 Responses (Response %)	Wave 3 Responses (Response %)
Child (10, 282)	2388 (23.2%)	1616 (67.7%)	1275 (78.9%)
Adult (1,170)	226(19.3%)	132 (58.4%)	84 (63.6%)
Total (11,452)	2614 (22.8%)	1748 (66.9%)	1359 (77.7%)

Web based survey completion continued to be the most frequent modality compared to telephone or paper survey response through Wave 3. During the initial planning, the prevailing belief was that majority of these enrollees would not be able to access internet-based surveys. Also, the evaluation team believed that implementation of full online modality without email addresses would potentially limit distribution. However, in response to community suggestions, the online modality was added as an initial option with the opportunity for participants to provide email addresses for future waves. This activity was fruitful with over 70% of Wave 1 participants providing an email address for Wave 2.

In Wave 1 of the enrollee survey, 85% of children and 80% of adults stated that they were already enrolled in Medicaid. However, over 400 survey participants reported this as a new form of coverage. The proportion of enrollees representing the expanded income levels (over 200% FPL) continue to be less than 5%.

In the Wave 1 survey, more than half (60%) of both survey cohorts (child and adult) *strongly agreed* or *agreed* with the statement that the Flint Medicaid waiver made it easier to get the health care they or their child needed. We did not ask this question in Wave 2 and Wave 3, but simply asked about the ease of getting care because it was understood that Wave 2 questions referred to waiver services.

Due to the longitudinal nature of the survey, responses in Wave 1 are correlated to those in Waves 2 and 3. Thus, we used ordinal logistic regression with a random intercept for each

survey participant to compare the change in probabilities in the ease of getting care. The Wald tests for the wave dummies showed no statistical significance in response in child survey, whereas the difference between Wave 1 and Wave 2 for adult survey was significant (Table 17). When asked about the ease of getting health care since enrollment in the Medicaid program child responses revealed similar results across Wave 1 through Wave 3. However, more adults reported increased difficulty (p=0.01) in getting health care in Wave 2 (12.4%) and Wave 3 (17.9%) versus Wave 1 (2.7%).

Table 17: General Ease of Getting Health Care

Question	Child*			Adult**		
Since enrolling in the Flint Medicaid waiver, how easy was it to get the medical care, tests, or treatment you/your child needed?	**Wave 1 (N=2360)**	**Wave 2 (N=1599)**	**Wave 3 (N=1267)**	**Wave 1 (N=221)**	**Wave 2 (N=129)**	**Wave 3 (N=84)**
Very Easy	1285 (54.4%)	860 (53.8%)	677 (53.4%)	94 (42.3%)	42 (32.3%)	28 (33.3%)
Easy	683 (28.9%)	481 (30.1%)	427 (33.7%)	80 (36.0%)	53 (40.8%)	33 (39.3%)
Not Easy, Not Difficult	307 (13.0%)	174 (10.9%)	117 (9.2%)	39 (17.6%)	17 (13.1%)	7 (8.3%)
Difficult	69 (2.9%)	68 (4.3%)	38 (3.0%)	6 (2.7%)	16 (12.3%)	15 (17.9%)
Very Difficult	15 (0.6%)	15 (0.9%)	8 (0.6%)	3 (1.3%)	2 (1.5%)	1 (1.2%)

* Child survey, p-value (Wave 2 vs. Wave 1)=0.32, p-value (Wave 3 vs. Wave 2)=0.89. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.01; p-value (Wave 3 vs. Wave 2)=0.51. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Sub-hypotheses 1.9: Improved Access to Care

1.9: *Enrollees will report improved satisfaction with their ability to access health care as a result of the expanded coverage.*

Beyond simply offering the opportunity for expanded access and coverage, another aspect related to uptake of waiver services was the overall satisfaction. The expanded coverage was offered through the health plans that operate in the affected geographic region. Thus, waiver participants had the benefit of existing health plan relationships with a variety of health care and community providers.

Satisfaction ratings were obtained through several questions in the survey. One question asked about overall satisfaction as a numeric score of 0-10 with 10 representing the high satisfaction. Additionally, a question about the health care provider working in the enrollee's interest was asked.

Overall satisfaction scores showed no significant difference between Wave 1 and Wave 2 for both the Child and Adult participants. Means for child satisfaction for Waves 1 through 3 were 7.4. The mean satisfaction rating for Adult survey participants was 7.0 for Wave 1, 6.7 for Wave 2, and 7.2 for Wave 3. This decline, from Wave 1 to Wave 2 for adults, was not statistically significant. The increase in satisfaction from Wave 2 to Wave 3 in adults was statistically significant (Table 18).

Table 18. Survey Participant Satisfaction with Health Care/Health Care Providers

Question	Child*			Adult**		
	Wave 1 (N=2365)	Wave 2 (N=1614)	Wave 3 (N=1273)	Wave 1 (N=223)	Wave 2 (N=138)	Wave 3 (N=84)
Mean Satisfaction Score (Mean, STD)	7.4 (2.4)	7.4 (2.4)	7.4 (2.6)	7.0 (2.3)	6.7 (2.5)	7.2 (2.5)

* Child survey, p-value (Wave 2 vs. Wave 1)=0.11; p-value (Wave 3 vs. Wave 2)=0.68. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.30; p-value (Wave 3 vs. Wave 2)=0.02. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted

The proportion of child survey participants who strongly agreed with the statement their provider was working in their interest increased from 25% in Wave 1 to 35% in Wave 2; this was a statistically significant increase. The proportions for child survey participants strongly agreeing to strongly disagreeing with the statement were statistically similar from Wave 2 to Wave 3. There was no detected change in the adult satisfaction, from Wave 1 to 2, with categorical values staying the same. In Wave 3, the proportion of adult survey participants agreeing with the statement increased but was not statistically significant (Table 19).

Table 19. Survey Participant Satisfaction with Health Care/Health Care Providers

Question	Child*			Adult**		
Since enrolling in the Flint Medicaid waiver, I feel that the health care providers are working in my/my child's best interest.	Wave 1 (N=2363)	Wave 2 (N=1603)	Wave 3 (N=1268)	Wave 1 (N=223)	Wave 2 (N=130)	Wave 3 (N=83)
Strongly Agree	597 (25.3%)	562 (35.1%)	448 (35.3%)	49 (22.2%)	31 (23.9%)	28 (33.7%)
Agree	926 (39.2%)	648 (40.4%)	556 (43.8%)	90 (40.0%)	56 (43.1%)	30 (36.1%)
Neutral	710 (30.0%)	324 (20.2%)	225 (17.7%)	67 (30.0%)	30 (23.1%)	18 (21.7%)
Disagree	99 (4.2%)	50 (3.1%)	32 (2.5%)	11 (4.9%)	8 (6.2%)	7 (8.4%)
Strongly Disagree	31 (1.3%)	19 (1.2%)	7 (0.1%)	6 (2.7%)	5 (3.8%)	0 (0.0%)

* Child survey, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)=0.34. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.66; p-value (Wave 3 vs. Wave 2)=0.11. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Domain 2: Access to Targeted Case Management

A variety of data sources contributed to the evaluation activities for Domain 2, "*enrollees who access TCM services will access needed medical, social, educational, and other services at a rate higher than enrollees with similar individual and neighborhood characteristics but do not take up TCM services".* Enrollees were identified through administrative data as individuals having any FME flag in the eligibility data. Information on clients served was also reported by GHS using a tracking system they instituted during the operational period of TCM services. These listings were compared against each other for completeness. Discrepancies between the two sources were noted and were unable to be fully reconciled. GHS reported a change in enrollment count methodology during 2021. Thus, this information will be explored for the final report. In addition to these sources, survey data from enrollees and TCM providers offered additional qualitative information regarding use and satisfaction with TCM services. Four sub-hypotheses were identified for testing.

The comparison group for Domain 2 reflects FME enrollees without TCM service participation based on administrative claims data. TCM was intended to facilitate access to services and mitigate barriers to care. Thus, the evaluation group anticipated that among those enrolled in FME, TCM participants would have greater access to and follow-through on health care compared to those who did not have these supports.

Sub-hypotheses 2.1-2.2: Improved Access to TCM

2.1: *Referral source and participation levels with TCM will be tracked among enrollees.*
2.2: *All TCM participants will have an annual assessment conducted.*

Table 20 provides information on the linked enrollees between GHS tracking and FME enrollment data. The count of unique individuals was decreasing over time until the most recent year. Referrals to GHS declined during 2017-2018 and 2018-2019 but increased 90% from 174 to 330 in the year prior to the pandemic. The 2019-2020 finding is attributed, in part, to increased operations of the Flint Registry funded by the CDC. Among other activities, the Flint Registry surveys residents of Flint for preliminary eligibility for the waiver and refers to GHS for full screening. GHS staff reported that most referrals were received from Medicaid Health Plans. These were not "warm" referrals but rather spreadsheets containing contact information which may have impacted participation. No claims with the appropriate CPT and NPI codes were identified between 5/1/2020 – 4/30/2021. Data was extracted several times without change. The timeframe began during the pandemic stay-home orders, beginning March 2020, which would have impacted these services. The approved reimbursement policy for TCM mandated face-to-face visits while TCM providers reported delivering services through audio or video visits. This would explain the inability to document reimbursed services. Enrollees may have been receiving services during this time but associated costs covered through alternative means.

GHS staff described being contacted by several Community Mental Health organizations in different areas of the state where FME enrollees had relocated; none of these organizations ultimately provided formal TCM services.

Table 20. Genesee Health System referral data linked to enrollment data

GHS Referral data linked to eligibility data from the Warehouse	T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
# of records	966	281	174	332	*
# of Unique ids	868	272	165	330	*
# of Unique ids not in the eligibility data set	8	1	2	0	*
# of Unique ids in eligibility data	860	271	163	330	*
Any month with FME enrollment flag	737 (85.7%)	220 (81.2%)	149 (91.4%)	263 (79.7%)	*
Any claim with HCPCS codes T2024 or T1017	172 (20.0%)	40 (14.8%)	52 (31.9%)	90 (27.3%)	*
Any claim with diagnosis Z77.011 (contact with and (suspected) exposure to lead)	181 (21.1%)	49 (18.1%)	50 (31.7%)	59 (17.9%)	*

*Data not available

Under-utilization of TCM services was also confirmed using administrative data sources per Table 21. Specific codes were authorized for billing of TCM annual assessments (CPT T2024) and follow-up visits (CPT T1027). These CPTs are allowable codes for other programs. Thus, it is necessary to link the allowable CPT with the appropriate provider through Provider ID. As mentioned, no claims were identified in the most current reporting year with the correct combination of identifiers.

Table 21: Number and Proportion of Total FME Enrollees Using TCM Services per Administrative Health Care Data

	5/1/2016—4/30/2017	5/1/2017—4/30/2018	5/1/2018—4/30/2019	5/1/2019—4/30/2020	5/1/2020—4/30/2021
FME enrollees statewide	33526	33916	31849	30996	28890
Had any TCM visit (N, %) defined by CPT "T2024" or "T1017"	1088 (3.2%)	1279 (3.8%)	1371 (4.3%)	1293 (4.2%)	1144 (4.0%)
Had any TCM visit (N, %) defined by CPT "T2024" or "T1017" with authorized TCM Provider ID	145 (0.4 %)	71 (0.2%)	60 (0.2%)	63 (0.2%)	*
TCM participant had annual assessment (N, %) defined by CPT "T2024" or "T1017" with authorized TCM Provider ID	34 (23.4%)	18 (25.4%)	18 (30.0%)	16 (25.4%)	*

*No observations with combination of CPT codes and NPI code for GHS.

Provider reported (GHS, MDHHS) metrics of TCM participation were found to be less than that reported through the Wave 1 enrollee survey. Approximately 10% of Wave 1 enrollee survey participants reported accessing these services (Table 22). This remained statistically unchanged for both Child and Adult participants through Wave 3. This is a positive finding because sustained utilization of TCM is documented despite the limitations on TCM in-person visits that would have been associated with pandemic related stay-home orders. This may reflect an enhanced sensitivity of survey participants to the water crisis. Those interested in taking advantage of the TCM services may be more likely to take the opportunity to respond to the survey as they were more invested in the program.

Table 22: TCM Participation Reported by Enrollees

Question	Child*			Adult**		
Have you ever used any Family Supports Coordination (Targeted Case Management) services for you (your child) since enrolling in the Flint Medicaid waiver?	**Wave 1[a] (N=2349)**	**Wave 2[ab] (N=1571)**	**Wave 3[ab] (N=1263)**	**Wave 1[c] (N=222)**	**Wave 2[cd] (N=126)**	**Wave 3[cd] (N= 82)**
Yes	239 (10.2%)	174 (11.1%)	125 (9.9%)	26 (11.7%)	16 (12.7%)	11 (13.4%)
No	2110 (89.8%)	1397 (88.9%)	1138 (90.1%)	196 (88.3%)	110 (87.3%)	71 (86.6%)

* Child survey, p-value (Wave 2 vs. Wave 1)=0.42; p-value (Wave 3 vs. Wave 2)=0.35. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.82; p-value (Wave 3 to Wave 2)=0.99. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

The evaluation team also conducted Key Informant Interviews (KII) with TCM Professionals at GHS and Greater Flint Health Coalition in 2019 and one year later in 2020 before the government shut down due to the COVID-19 pandemic. Findings from the first interview were confirmed in the second year with very few changes or new information. Representatives of both organizations indicated they were able to accommodate all clients and referrals that had been received to date. Staffing levels did not require stratification or triage of referrals. A third opportunity to collect input from the TCM Professionals was implemented during 2021.

When asked, TCM Professionals offered potential reasons for the low uptake of TCM services including client concerns about taking referrals when they knew of others who needed them to a greater degree. TCM Professionals also mentioned operational aspects that had opportunities for improvement. For example, enrollees sometimes became frustrated with the time it took to put treatment plans into action. According to the TCM Professionals, these factors were often outside of their organizational control that hindered receipt of services, such as transportation

or wait times at partner organizations. However, informants believed their clients had trust in their services because many of them were existing clients that now qualified for the waiver.

During the second wave of interviews, staff from both GHS and GFHC stated that they had been busier than usual since the COVID-19 pandemic. There was an increased client need for resources at the same time resource availability was compromised due to government imposed shut-downs. The TCM Professional from GHS reported that the number of referrals has decreased at the third wave while the GFHC staff member noted that the number of client referrals has been consistent since the COVID-19 pandemic began. The TCM Professionals report increased staff time is needed to identify resources. Delivery of TCM services pivoted to using technology to continue their work including video and telephone, zoom and video chat. Through telehealth they could continue to complete assessments, plans of care, and referrals.

Sub-hypotheses 2.3-2.4: Improved Access to TCM

Two additional sub-hypotheses were developed to document the impact of TCM on individual receipt of care. The logic was FME enrollees who participated with the TCM program received additional encouragement and assistance in recognizing the importance of the identified screenings and mitigating barriers to securing these screenings. While the waiver itself was hypothesized to increase access to care, TCM specifically was hypothesized to maximize the impact through direct assistance to FME enrollees in navigating the health care system.

2.3: *A greater proportion of TCM participants will have age-appropriate well child exams compared to TCM non-participants.*
2.4: *A greater proportion of TCM participants will have completed age-appropriate developmental screening compared to TCM non-participants.*

During the analytic processes, the evaluation team recognized the use of applicable procedure codes in Medicaid enrollees who did not appear to be enrolled in the FME waiver specifically. When TCM participation was identified using CPT codes (T2024 or T1017) together with the designated billing NPI for GHS, the number was quite low. Using these numbers, with caution, we examined 3 HEDIS metrics for sub-hypothesis 2.3 and 2 HEDIS metrics for sub-hypothesis 2.4. These metrics are defined in sub-hypothesis H1.1 and H1.2. The data for these hypotheses are suppressed for this report because the numbers are too low, except for the well child visits in the third, fourth, fifth and sixth years of life metric. These metrics appeared to be impacted by the coronavirus pandemic which affected health service delivery during the data year 5/1/20 – 4/30/21.

For this well child visit measure only, FME enrolled/TCM participants appear to have higher proportions of obtaining these visits compared to the FME enrolled but TCM non-participants (Table 23). However, due to the small numbers and severe imbalance in sample sizes between

participants and non-participants, the evaluation team did not carry out statistical tests for this comparison.

Table 23: Comparison of Proportion of TCM Participants vs. TCM Non-Participants Among FME Enrollees Having Well Child Visits (3, 4, 5, 6 yrs.).

Measure		T3: 5/1/2016—4/30/2017	T3: 5/1/2017—4/30/2018	T3: 5/1/2018—4/30/2019	T3: 5/1/2019—4/30/2020	T3: 5/1/2020—4/30/2021
Well Child Visits (0-15 mos.)	TCM*	9 (100.0%)	**	5 (100.0%)	**	**
	Non-TCM	1249 (97.3%)	1490 (97.6%)	853 (97.8%)	452 (97.8%)	**
Well Child Visits (3, 4, 5, 6 yrs.)	TCM*	29 (78.4%)	17 (94.4%)	18 (90.0%)	16 (84.2%)	**
	Non-TCM	4030 (70.7%)	4537 (72.5%)	4435 (72.3%)	4086 (69.1%)	**
Well Adolescent Visits (12-21 yrs.)	TCM*	5 (20.0%)	13 (54.2%)	**	10 (52.6%)	**
	Non-TCM	3730 (41.5%)	4127 (41.3%)	4249 (42.3%)	3885 (38.6%)	**
Developmental Screening (0-3 yrs.)	TCM*	**	**	**	**	**
	Non-TCM	12 (0.3%)	167 (3.5%)	102 (2.8%)	19 (0.7%)	**
Behavioral Screening (4-17 yrs.)	TCM*	**	**	7 (17.9%)	5 (10.2%)	**
	Non-TCM	50 (0.3%)	858 (5.1%)	1519 (9.0%)	1213 (7.2%)	**

**No observations with combinations of CPT codes and NPI code for GHS.

Domain 3: Improved Health Outcomes

A variety of data sources contributed to the evaluation activities for Domain 3, "*Enrollees will have improved health outcomes compared to non-enrollees with similar individual and neighborhood characteristics".* Six sub-hypotheses were identified. Three of these (3.4, 3.5, 3.6) were deemed provisional at the time of evaluation approval since it was unclear whether the evaluation team would be granted access to the necessary data. Confirmation has been received that individual level data maintained by the MDE and protected under FERPA laws is not available for evaluation purposes. In response, the evaluation team drafted education related questions to include into enrollee surveys.

Sub-hypotheses 3.1-3.2: Improved Health Outcomes

3.1. *Enrollees will have higher completed age-appropriate immunization statuses than the comparison.*
3.2. *Enrollees who are pregnant will deliver infants with higher birth weights than the comparison.*

The immunization measure proxy was intended to reflect the proportion of children and adolescents who were fully immunized as recommended. These are referred to as combination measures and the specific HEDIS metrics included:

- Combination 10: The percentage of children 2 years of age who had four diphtheria, tetanus and acellular pertussis (DTaP); three polio (IPV); one measles, mumps and rubella (MMR); three haemophilus influenza type B (HiB); three hepatitis B (HepB), one chicken pox (VZV); four pneumococcal conjugate (PCV); one hepatitis A (HepA); two or three rotavirus (RV); and two influenza (flu) vaccines by their second birthday. The numbers reported below are the enrollees having all 10 vaccines.
- Combination 2: The percentage of adolescents 13 years of age who had one dose of meningococcal conjugate vaccine, one tetanus, diphtheria toxoids and acellular pertussis (Tdap) vaccine, and have completed the human papillomavirus (HPV) vaccine series by their 13th birthday. The measure calculates a rate for each vaccine and two combination rates. The numbers reported below are the enrollees having all 3 vaccines.

The birthweight measure was designated as a proxy for optimal perinatal care. Women receiving this care would be expected to deliver fewer infants with low birth weights. Low birthweight has been associated with a variety of adverse outcomes in infants. The measure reported was:

- The proportions of live births with birthweight < 2500 grams (i.e., low birth weight, LBW) with higher proportion corresponding to worse outcome).

The childhood immunization and adolescent immunization measures were updated using the combination of CPT codes from Medicaid claim data and immunization records from Michigan Care Improvement Registry data (MCIR). So, the number of sample sizes is larger than last year's report in each cell. The immunization rates in children 2 years of age were around 10% across 2016-2020 and increased to 11 % in 2020-2021 for the FME enrollees' group. In the comparison group, the rates were steady at 9%. The adolescent immunization rates were steady in the waiver enrollees whereas there was a small decline in the comparison. The LBW proportions in the waiver enrollees declined over time where was the comparison group had a stable rate. Logistic regressions with a cluster robust standard error to compare the trends of the outcomes between FME enrollees and their comparison was used controlling for children's sex (for H3.1 only), race and census-tract level socioeconomic and environmental factors.

A statistically significant difference was documented with FME enrollees having greater childhood immunization compared to the Comparison Group (p-value=0.04, Table 24). The statistically significant difference was found between FME enrollees and comparison group for adolescent immunization (P-value<0.01). We found no statistically significant differences between the two groups for LBW (p-value=0.25).

Table 24: Comparison of FME Enrollees and Comparison Group non-FME for Sub-hypotheses 3.1. and 3.2 (the n is the numerator for each measure and % is the proportion of n in the appropriate denominator) *

Sub-hypothesis	Target population	T2: 5/1/2014 - 4/30/2015	T2: 5/1/2015-4/30/2016	T3: 5/1/2016-4/30/2017	T3: 5/1/2017-4/30/2018	T3: 5/1/2018-4/30/2019	T3: 5/1/2019-4/30/2020	T3: 5/1/2020-4/30/2021
3.1.1 Childhood Immunization Combination #10	FME Enrollees	N.A.	N.A.	132 (9.6%)	169 (10.8%)	161 (10.6%)	65 (10.0%)	54 (11.3%)
	Comparison Group	73 (1.8%)	329 (8.7%)	186 (8.3%)	217 (8.7%)	251 (9.9%)	310 (9.4%)	317 (9.1%)
3.1.2. Adolescent Immunization Combination	FME Enrollees	N.A.	N.A.	667 (64.4%)	754 (64.0%)	777 (64.1%)	832 (66.6%)	843 (63.4%)
	Comparison Group	1200 (33.8%)	2138 (64.1%)	1459 (63.5%)	1368 (60.5%)	1441 (61.3%)	1387 (57.8%)	1308 (49.0%)
3.2 Proportion Infants with Low Birth Weight	FME Enrollees	N.A.	N.A.	211 (15.0%)	87 (13.9%)	69 (13.7%)	65 (12.5%)	60 (11.8 %)
	Comparison Group	381 (15.5%)	593 (13.0%)	388 (11.7%)	485 (12.4%)	483 (12.4%)	393 (12.1%)	399 (11.9 %)

These individuals are the Genesee target population without FME flag plus Saginaw target population. "Target" refers to the appropriate denominator for each sub-hypothesis.

* Cell sample sizes changed from previous report because the evaluation team had access to immunization records in MCIR data.

Sub-hypotheses 3.3: Improved Health Outcomes

3.3: *Enrollees report an increase in their self-reported health status over the duration of their enrollment.*

Reported health rankings improved for both child and adult in the proportion reporting the excellent category (Table 25). Approximately 70% of both survey populations classified their health in the top three rating categories for Waves 1 through 3. For child survey results, improvements were significant ($p<0.01$) between Wave 1 and Wave 2, Wave 1 and Wave 3, but not between Waves 2 and 3. Increase in overall well-being for adults between the Waves for adults were not significant.

Table 25: Enrollee Self-Reported Overall Health Status (Wave 1 – Wave 3)

Question	Child*			Adult**		
In general, how would you rate your/your child's overall health (both physical and behavioral/emotional) since enrolling in the Flint Medicaid Waiver?	**Wave 1 (N=2373)**	**Wave 2 (N=1603)**	**Wave 3 (N= 1273)**	**Wave 1 (N=224)**	**Wave 2 (N=130)**	**Wave 3 (N= 84)**
Excellent	546 (23.0%)	429 (26.8%)	339 (26.6%)	29 (13.0%)	26 (20.0%)	18 (21.4%)
Very Good	669 (28.2%)	476 (29.7%)	398 (31.3%)	53 (23.7%)	30 (23.1%)	20 (23.8%)
Good	706 (29.8%)	436 (27.2%)	365 (28.7%)	85 (38.0%)	42 (32.3%)	28 (33.3%)
Fair	378 (15.9%)	227 (14.2%)	143 (11.2%)	45 (20.1%)	26 (20.0%)	13 (15.5%)
Poor	74 (3.1%)	35 (2.2%)	28 (2.2%)	12 (5.4%)	6 (4.66%)	5 (6%)

* Child survey, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)=0.52. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.12; p-value (Wave 3 vs. Wave 2)=0.82. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Health status ratings were subdivided by 1) physical and 2) behavioral/emotional health aspects. The experience of the individuals affected by the Flint Water Crisis revealed significant impacts on both physical and emotional well-being particularly for children. Survey estimates reinforce this observation with generally higher rankings for physical health compared to behavioral/emotional health (Tables 26 and 27). Child physical health status increased between Wave 1 and Wave 2 was significant ($p \leq 0.01$.) As for child emotional well-being, reported improvement was found to be significant between Wave 1 and Wave 2 ($p=0.03$) and Wave 1 and Wave 3 ($p<0.01$), but no improvement was observed between Wave 2 and Wave 3. For adults, increase in emotional well-being was observed between Wave 1 and Wave 3 ($p<0.01$) but not for other comparisons.

Table 26: Enrollee Self-Reported Physical Health Status (Wave 1 to Wave 3)

Question	Child*			Adult**		
In general, how would you rate your/your child's physical health since enrolling in the Flint Medicaid Waiver?	**Wave 1 (N=2368)**	**Wave 2 (N=1601**	**Wave 3 (N=1272)**	**Wave 1 (N=224)**	**Wave 2 (N=130)**	**Wave 3 (N=84)**
Excellent	622 (26.3%)	508 (31.7%)	439 (34.5%)	36 (16.1%)	29 (22.3%)	18 (21.4%)
Very Good	704 (29.7%)	508 (31.7%)	412 (32.4%)	54 (24.1%)	37 (28.5%)	23 (27.4%)
Good	665 (28.1%)	409 (25.6%)	319 (25.1%)	75 (33.5%)	38 (29.2%)	27 (32.1%)
Fair	320 (13.5%)	162 (10.1%)	88 (6.9%)	41 (18.3%)	20 (15.4%)	8 (9.5%)
Poor	57 (2.4%)	14 (0.9%)	14 (1.1%)	18 (8.0%)	6 (4.6%)	8 (9.5%)

* Child survey, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)<0.01. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)=0.46. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Table 27: Enrollee Self-Reported Behavioral/ Emotional Health Status (Wave 1 to Wave 3)

Question	Child*			Adult**		
In general, how would you rate your/your child's behavioral/emotional health since enrolling in the Flint Medicaid Waiver?	**Wave 1 (N=2365)**	**Wave 2 (N=1594)**	**Wave 3 (N=1268)**	**Wave 1 (N=223)**	**Wave 2 (N=130)**	**Wave 3 (N=84)**
Excellent	419 (17.7%)	296 (18.6%)	240 (18.9%)	30 (13.5%)	23 (17.7%)	16 (19.0%)
Very Good	462 (19.5%)	375 (23.5%)	310 (24.5%)	41 (18.4%)	16 (12.3%)	18 (21.4%)
Good	660 (27.9%)	378 (23.7%)	329 (26.0%)	49 (22.0%)	37 (28.5%)	20 (23.8%)
Fair	548 (23.2%)	391 (24.5%)	279 (22.0%)	70 (31.4%)	32 (24.6%)	20 (23.8%)
Poor	276 (11.7%)	154 (9.7%)	110 (8.7%)	33 (14.8%)	22 (17.0%)	10 (11.9%)

* Child survey, p-value (Wave 2 vs. Wave 1)=0.03; p-value (Wave 3 vs. Wave 2)=0.25. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.68; p-value (Wave 3 vs. Wave 2)=0.21. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Sub-hypotheses 3.4-3.6: Improved Health Outcomes

The remaining sub-hypotheses were deemed provisional due to concerns over data availability and appropriateness as a comparison. These sub-hypotheses were intended to report on the educational and development delays that might be expected from lead exposure. Questions were added to the enrollee surveys to obtain similar self-reported measures.

The Mi School Data Dashboard was also referenced to provide community level data on these educationally focused hypotheses. Although the data could not be linked to FME enrollment status, these data are presented for Flint City Schools as well as Saginaw City Schools to provide some context.

P3.4. Descriptive analysis of the proportion of children diagnosed with severe emotional disturbance and other developmental/learning disabilities including comparing rates to others with similar lead exposures.

Children enrolled in the SED waiver were identified to not be an appropriate comparison group. The SED Waiver enrolls just approximately 400 enrollees statewide. However, the acuity and eligibility criteria are significant requiring child psychiatric hospital admission or risk of admission in absence of the SED Waiver services. Therefore, the evaluation team decided against reporting descriptive results associated for this category of children.

The Mi School Data Dashboard does provide some educational system classifications on developmental and learning disabilities for K-12 and early education.[10] However, Mi School data does not directly address behavioral health other than special education services for emotional impairment (EI). The pandemic caused schools across the state to move to virtual instruction during the pandemic involving the 2019/2020 school year. This adversely impacted the usual reporting and state testing. According to the public reporting, there is no difference between Flint City and Saginaw City schools with approximately 1% having EI.

P3.5. Descriptive analysis of behavioral health conditions and supportive care among enrolled children.
P3.6. Descriptive analysis of educational delays among enrolled children.

School enrollments in Flint City Schools have been decreasing steadily for the last four decades. Much has been due to loss of jobs in the Flint Area tied to the automobile industry and the proliferation of charter schools located throughout the city. Flint and Genesee County have a very complex school system with approximately 25 school “districts”. This includes charter schools that qualify as independent school districts. Flint City Schools are selected and reported here because they most closely align with the target geographic area defined by the 11 zip codes of the FWSA.

Although enrollment has decreased, special education and Individualized Education Program (IEP) rates have steadily increased for Flint City Schools. This increase may be partly due to

families with resources leaving the school district or even traveling to charter schools within the region. Table 28 displays proportion of students having the following classifications: IEP, Cognitive Impairment (CI), Emotional Impairment (EI), Early Childhood Development Delay (ECDD), and enrolled in Early On (targeting Birth to 3 years prior to school entry). Data from the 2012/2013 through 2019/2020 school years were obtained.

For the comparison Saginaw City Schools, enrollment has been declining but not as sharply as Flint City Schools (Figure 2). However, the proportions of educational delay and services have remained relatively consistent compared to the observation for Flint City Schools (Figure 3). Several complex factors beyond family resources may influence school movement during an environmental crisis affecting enrollment and student make-up. These include the selective movement of students to certain schools in response to publicized mission along with true developmental/physiologic impacts of the crisis on children's neurologic systems.

The evaluation team was not able to obtain grade level retention or test scores because of difficulty communicating with Saginaw and Flint ISD during the coronavirus pandemic in time for this annual report. However, continued partnership with the MSU College of Education's K-12 Office of Educational Outreach is ongoing and efforts to obtain school grade progression data continues.

Table 28: Proportion of Students having Educational Program Designated Characteristics

School Year	City School District	Enrollment	IEP (%)	CI (%)	EI (%)	ECDD (%)	Early On (0-3 yrs) (%)
T1: 12-13	Flint	9682	1268 (13.1)	273 (2.3)	52 (0.5)	60 (0.6)	75 (0.8)
	Saginaw	8010	1101 (13.7)	78 (1.0)	80 (1.0)	34 (0.6)	9 (0.1)
T1: 13-14	Flint	7232	1094 (15.1)	212 (2.9)	51 (0.7)	54 (0.7)	54 (0.7)
	Saginaw	7835	1035 (13.2)	74 (0.9)	69 (0.9)	37 (0.7)	12 (0.2)
T2: 14-15	Flint	6550	985 (15.0)	181 (2.8)	25 (0.4)	45 (0.7)	22 (0.3)
	Saginaw	6915	949 (13.7)	73 (1.0)	63 (0.9)	40 (0.7)	17 (0.2)
T2: 15-16	Flint	5426	907 (16.7)	160 (2.9)	40 (0.7)	42 (0.8)	26 (0.5)
	Saginaw	6622	892 (13.5)	66 (1.0)	53 (0.8)	61 (0.8)	28 (0.4)
T3: 16-17	Flint	4893	853 (17.4)	169 (3.5)	47 (1.0)	56 (1.1)	27 (0.6)
	Saginaw	6067	850 (14.0)	68 (1.1)	45 (0.7)	71 (1.1)	28 (0.5)
T3: 17-18	Flint	4565	902 (19.8)	159 (3.5)	47 (1.0)	44 (1.0)	11 (0.2)
	Saginaw	5797	834 (14.4)	77 (1.3)	35 (0.6)	62 (1.0)	25 (0.4)
T3: 18-19	Flint	4264	875 (20.5)	164 (3.8)	42 (1.0)	38 (0.9)	17 (0.4)
	Saginaw	5463	804 (14.7)	72 (1.3)	28 (0.5)	66 (0.9)	31 (0.6)
T3: 19-20	Flint	3749	854 (22.7)	273 (7.3)	52 (1.4)	25 (0.7)	16 (0.4)
	Saginaw	5286	788 (14.9)	70 (1.3)	20 (0.3)	25 (0.7)	29 (0.5)

IEP=Individualized Education Program, CI=Cognitive Impairment, EI=Emotional Impairment, ECDD=Early Childhood Developmental Delay

Figure 2: Flint vs. Saginaw School Enrollment 2012-2013 to 2019-2020

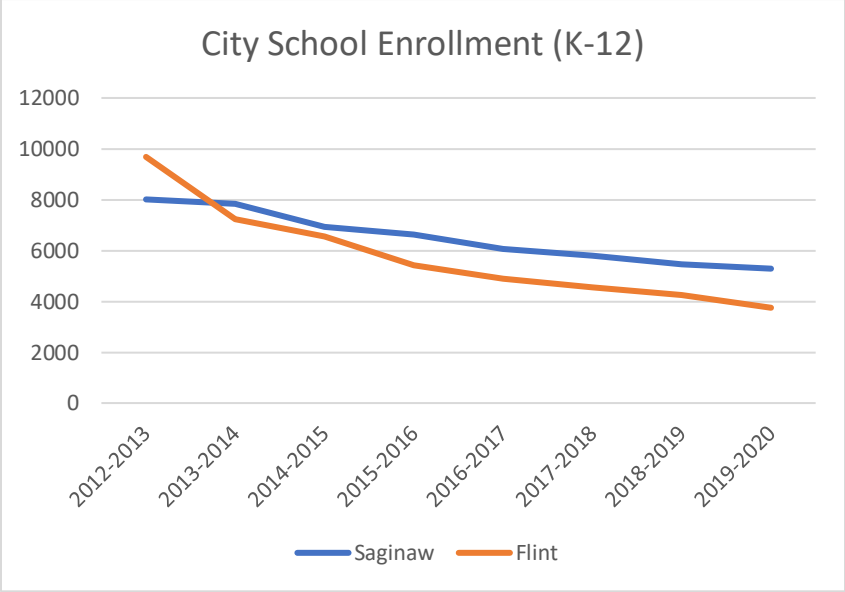
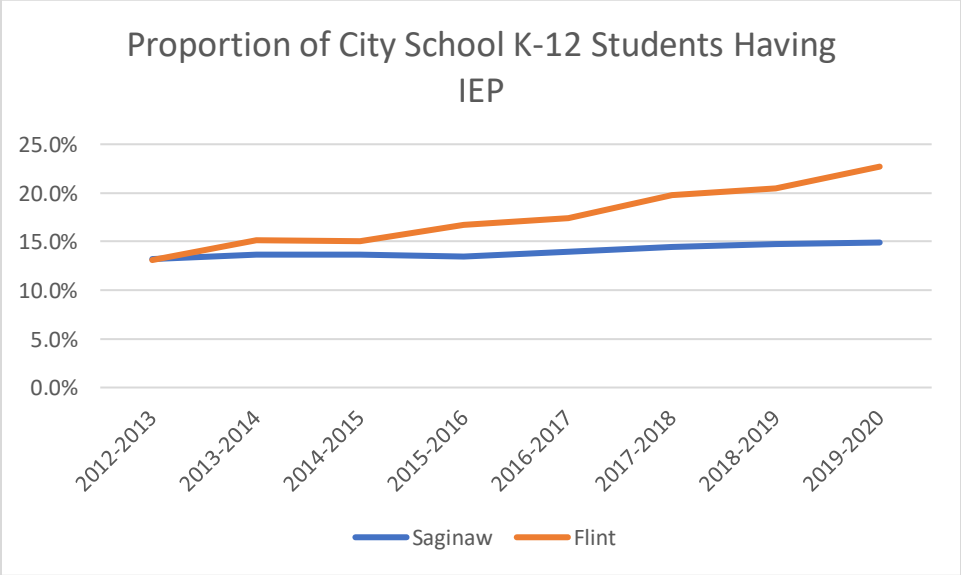


Figure 3: Flint vs. Saginaw Proportion Students having IEP: 2012-2013 to 2019-2020



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The Enrollee Child Survey also served as a supplemental source of self-reported data to obtain information on behavioral and educational issues referenced in provisional hypotheses 3.4 and 3.5. Three-quarters of participants, in all survey waves, denied being informed by a health care provider that their child has a behavioral or emotional problem (Table 29).

Participants in the child survey were asked to report if they had been informed by a health care professional or by daycare/school staff that the child had a behavioral or emotional problem

(Table 29). The results indicate significance between Wave 1 and Wave 2 (p<0.01) with caregivers reporting if a healthcare provider indicated their child had a behavioral/emotional problem. No detectable decrease between Wave 2 and Wave 3 was observed. The initial decrease was observed at Wave 2 and was sustained in Wave 3. When parents were asked if they had been told by school related personnel (teacher, school nurse) if their child had emotional problem, a significant decrease was found only between Wave 2 and Wave 3 (p<0.01), but not between other pairwise Wave comparisons.

Table 29: Child Behavioral/Emotional Problem Reporting

Question	**Wave 1[a] (N=2370)**	**Wave 2[ab] (N=1591)**	**Wave 3[ab] (N=1269)**
Have you ever been told by a doctor or nurse that your child has a behavioral or emotional problem?	**N (%)**	**N (%)**	**N (%)**
Yes	541 (22.8%)	315 (19.8%)	231 (18.2%)
No	1772 (74.8%)	1246 (78.3%)	1012 (79.8%)
Don't know/Don't remember	57 (2.4%)	30 (1.9%)	26 (2.0%)
Question	**Wave 1[c] (N=2369)**	**Wave 2[cd] (N=1595)**	**Wave 3[cd] (N=1272)**
Has a daycare or school teacher or school nurse ever told you that your child has a behavior or emotional problem?	**N (%)**	**N (%)**	**N (%)**
Yes	601 (25.4%)	346 (21.7%)	212 (16.7%)
No	1527 (64.5%)	1139 (71.4%)	969 (76.2%)
Don't know/Don't remember	47 (2.0%)	23 (1.4%)	24 (1.9%)
Child is not in school aged/not in school	194 (8.2%)	23 (1.4%)	24 (1.9%)

* Question 6, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)=0.37. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Question 7, p-value (Wave 2 vs. Wave 1)=0.34; p-value (Wave 3 vs. Wave 2)<0.01. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Most caregivers reported their children were in the expected grade level in Wave 1. This increased significantly (p<0.01) between all Waves; Wave 1 and Wave 2 (p<0.01), Wave 1 and Wave 3 (p<0.01) and Wave 2 and Wave 3 (p=0.02) indicating that more children were in the expected graded level (Table 30). It is also noted that there are lower “not in school responses”

from Waves 1 to 3. As expected, an increase in school enrollment as children increased in age over time from Wave 1 through Wave 3.

Table 30: Child Educational Status Reporting

Question	Wave 1 (N=2374)	Wave 2 (N=1598)	Wave 3 (N=1272)
Is your child in the grade level expected for his or her age?	N (%)	N (%)	N (%)
Yes	1624 (68.4%)	1189 (74.4%)	988 (77.7%)
No	371 (15.6%)	240 (15.0%)	178 (14.0%)
Don't know	35 (1.5%)	19 (1.2%)	24 (1.9%)
Not in school	345 (14.5%)	150 (9.4%)	82 (6.4%)

*p-value (Wave 2 vs. Wave 1)<0.01, p-value (Wave 3 vs. Wave 2)=0.02. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Domain 4: Lead Hazard Investigation

The evaluation team has been unable to secure individual level data to support Domain 4, *"The lead hazard investigation program will reduce estimated expected ongoing or re-exposure to lead hazards in the absence of this program."* Particularly, direct access to information regarding lead hazard mitigation services are housed outside of MSA and no data was available through claims/encounter files. The intent of this benefit was to expand lead screening and investigation services for individuals affected by the water but not having a documented elevated BLL. The assumption was that early identification of environmental exposures or risks could ensure access to services intended to minimize those risks.

Two sub-hypotheses were drafted and supplemental data sources including the enrollee survey and key informant interviews were identified. The evaluation team drafted lead exposure related questions to include in the enrollee surveys to provide contextual information. The TCM Providers (KII) identified the lack of safe water as an ongoing exposure risk through 2020 with clients continuing to use bottled water in the community. Concerns regarding drinking water were no longer in the top 3 as reported by the TCM Providers during the third contact. Additionally, community reporting of lead hazard mitigation was shared by the Flint Registry through the published Flint Lead Free reports. The full 2017 and 2021 reports are attached in Appendix 6.

Sub-hypotheses 4.1-4.2: Lead Hazard Investigation

4.1. *Enrollees without elevated blood lead levels and participating with TCM services will access lead hazard investigation services to the same degree as beneficiaries with elevated blood lead levels.*

4.2. Beneficiaries found to be at risk for ongoing lead exposure will be referred for additional environmental investigation.

The following enrollee survey questions addressed potential lead exposure from Flint water use. According to the enrollee survey participants with children in the home, slightly more than half continue to use water supplied by the Flint water system (Table 31). There was no change across Waves 1 through 3 for child in the use of tap water. In Wave 3, there was an increase in the percent of participants using water supplied by the Flint water system, however this was not statistically significant.

Table 31: Enrollee Survey Reported Use of Flint Water

Question	Child*			Adult**		
Do you/your child use water supplied by the City of Flint, also known as tap or faucet water right now?	**Wave 1 (N=2377)**	**Wave 2 (N=1600)**	**Wave 3 (N=1272)**	**Wave 1 (N=225)**	**Wave 2 (N=127)**	**Wave 3 (N=84)**
Yes	1204 (50.7%)	810 (50.6%)	658 (51.7%)	142 (63.1%)	77 (60.6%)	59 (70.2%)
No	1158 (48.7%)	781 (48.8%)	606 (47.6%)	83 (36.9%)	49 (38.6%)	24 (28.6%)
Don't Know/Unsure	15 (0.6%)	9 (0.6%)	8 (0.6%)	0 (0.0%)	1 (0.8%)	1 (1.2%)

* Child survey, p-value (Wave 2 vs. Wave 1)=0.88; p-value (Wave 3 vs. Wave 2)=0.45. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.40; p-value (Wave 3 vs. Wave 2)=0.17. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

In addition to assessing current use of city water, the survey was used to obtain information on water pipe replacement. For households with children, it was reported that water pipes had been replaced between Waves 1, 2, and 3 with all Wave comparisons significant at $p<0.01$. Adult respondents reporting of pipe replacement was not found to be significant over time. It should also be noted that enrollees may not know if their pipes have been replaced particularly if they lived in an apartment or multifamily dwelling.

Table 32: Enrollee Survey Reported Water Pipe Replacement

Question	Child*			Adult**		
Since the last survey, have the water pipes to your home or residence been replaced?	Wave 1[a] (N=2317)	Wave 2[ab] (N=1587)	Wave 3[ab] (N=1270)	Wave 1[c] (N=225)	Wave 2[cd] (N=128)	Wave 3[cd] (N=84)
Yes	577 (24.9%)	418 (26.3%)	364 (28.7%)	64 (28.4%)	28 (21.9%)	30 (35.7%)
No	1091 (47.1%)	780 (49.2%)	656 (51.7%)	87 (39.1%)	62 (48.4%)	32 (38.1%)
Don't know/unsure	649 (28.0%)	389 (24.5%)	250 (19.7%)	73 (32.4%)	38 (29.7%)	22 (26.2%)

* Child survey, p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)<0.01. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.
** Adult survey, p-value (Wave 2 vs. Wave 1)=0.68; p-value (Wave 3 vs. Wave 2)=0.16. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

The prevalence of pediatric EBLL according to available administrative data was quite low. Child survey respondents were also asked about history of diagnosed elevated blood lead levels. However, there was as significant decrease in reported child EBLL from Wave 1 to Wave 2 (p<0.01) No detectible difference was found for other comparisons.

Table 33: Enrollee Survey Reported Elevated Blood Lead Levels

Question	Child		
Since the last survey, has a doctor or nurse ever told you that your child had a high blood lead level?	Wave 1 (N=2366)	Wave 2 (N=1583)	Wave 3 (N=1268)
Yes	200 (8.4%)	55 (3.5%)	46 (3.6%)
No	1962 (82.9%)	1420 (89.7%)	1125 (88.7%)
Don't know/Unsure	204 (8.6%)	108 (6.8%)	97 (7.6%)

* p-value (Wave 2 vs. Wave 1)<0.01; p-value (Wave 3 vs. Wave 2)=0.43. P-values are based on random-effects ordered logistic models under the proportional odds assumption unadjusted and unweighted.

Full remediation of water as an exposure threat will only be completed when the water service lines have been fully replaced. Although this is a community priority, work is expected to continue through 2022 with no finite time for completion at this time.

Collaboration with the CDC funded Flint Registry has provided community level information regarding lead exposures published in the Flint Lead Free 2021 Report. The report provided a comprehensive summary of trends emphasizing lead prevention efforts. A copy of the report is

available in Appendix 6. Notably, the percent of residential water testing with elevated lead levels decreased from 2015 to 2019 and the number of environmental investigations increased from 2015 to 2019. With respect to the waiver's authorization of expanding Lead Safe Home Program services to the targeted population without documented EBLL, the proportion of investigations for children not having the extreme levels increased from approximately 13% in 2015 to 97% in 2019. Although not directly related to waiver documentation, this observation suggests the community was able to obtain home investigations without documented EBLL.

Conclusions

This Flint Water Crisis affected a distinct community that was already, and continues to be, economically vulnerable and exposed to environmental and social stressors.[1-2,6] The FME waiver was established in part to address resulting health effects and improve health outcomes for the next generation. This report incorporated service dates from 5/1/2020 – 4/30/2021; this timeframe was significantly affected by pandemic related restrictions and closures. Particularly, preventive service utilization experienced declines compared to prior years. This finding has been documented in statewide reporting of lead screening and statewide HEDIS reporting. Thus, the statistical testing focused on trends over all the waiver years in the FME cohort compared to the selected comparison group should be interpreted with caution. National reports are beginning to document some level of rebounding in these types of services. The extension that was approved during 2021 will allow the evaluation team to incorporate an additional year to the project. This will provide an opportunity to determine if the same rebounding would occur with waiver enrollees. The impact on administrative data resulted in greater scrutiny of enrollee and TCM provider inputs. The extension period provided additional opportunity to conduct additional waves of data collection.

Based on the available evaluation data from 2018 through 2021, the demonstration appears to be successful in meeting elements of the overall stated goal. Several measures in Domain 1: Access to Care demonstrated rate increases while others remained stable. Only two of the sub-hypotheses measures had lower rates in the waiver group compared to the comparison group. The impact of Domain 2: Access to TCM could not be quantified. No administrative health care data was available to compare TCM participants to non-participants. Enrollee survey responses indicate satisfaction among those who have engaged. Statistical comparisons to quantify "Domain 3: Improved Health Outcomes" suggest the FME group had statistically higher rates of complete adolescent immunization in years 4 and 5 compared to the comparison group. Child survey responses document significant improvement in physical health status over 3 survey waves. Community reported and self-reported data on decreasing child EBLL provided some evidence that lead hazard investigations are increasing as described in Domain 4.

Domain 1, Access to Care, has been documented with administrative data and supported with information provided directly from enrollees through the survey process. Most participants documented the waiver made it easier for them to access care and services. This is based on enrollee endorsement on all three Waves of the Enrollee Survey. Based on administrative health care data before the pandemic, several measures suggested increased utilization since the water switch (e.g., developmental, or behavioral screening, retesting of children having elevated BLL and lead testing in pregnant women). Reviewed here are the hypotheses for Domain 1.

1. *A greater proportion of enrollees will obtain age-appropriate well-child exams than non-enrollees with similar individual and neighborhood characteristics.* The proportion of FME children ages 3-6 outperformed the Comparison Group.
2. *A greater proportion of enrollees will receive age-appropriate developmental screening/assessments than non-enrollees with similar individual and neighborhood characteristics*. The observed trends for FME enrollees revealed statistically significant higher proportions of children receiving developmental screening in the first 3 years of life and behavioral screening in children age 4-7 than the Comparison Group.
3. *A greater proportion of enrollees will receive age appropriate lead testing than non-enrollees with similar individual and neighborhood characteristics.* No statistically significant differences before the pandemic in the trends of proportion of children receiving lead testing in the FME cohort compared to the Comparison Group were documented.
4. *A greater proportion of enrollees with high blood lead levels will receive re-testing at the appropriate intervals than non-enrollees with similar individual and neighborhood characteristics*. Despite the lack of statistical significance, the follow-up of testing for elevated levels was higher in FME children compared to the Comparison Group.
5. *Enrollees who are pregnant will have timelier prenatal and postpartum care than non-enrollees with similar individual and neighborhood characteristics.* Conflicting patterns were noted for these measures. The difference in trend for timely prenatal care favored FME enrollees while the difference in trend for post-partum care was not statistically significant.
6. *A greater proportion of enrollees who are pregnant will have recommended lead testing than non-enrollees with similar individual and neighborhood characteristics.* The difference in trends for lead testing in pregnant women were not tested statistically due to the rate drop in both groups during the pandemic, however, FME enrollees generally had higher rates than the Comparison Group.
7. *A greater proportion of enrollees will participate with Maternal Infant Home Program (MIHP) services than non-enrollees with similar individual and neighborhood characteristics*. Statistical analyses revealed similar trends in the proportion of FME enrollees for MIHP participation as for the Comparison Group.
8. *The majority of enrollees will attest to improved access to health care as a result of the expanded coverage*. More than half of child survey participants reported accessing care was “easy” at Wave 1. No statistically significant change was observed between Wave 1 and Wave 2 or between Wave 2 and Wave 3 for the child cohort. In contrast, adult survey participants reported a statistically significant increase in difficulty accessing care between Wave 1 and Wave 2 and no significant change between Wave 2 and Wave 3.

9. *The majority of enrollees will report improved satisfaction with their ability to access health care as a result of the expanded coverage*. Numeric satisfaction scores did not change significantly from Wave 1 to Wave 2 for either the child or adult survey cohorts; but it increased for the adult survey from Wave 2 to Wave 3. Overall satisfaction scores were approximately 7/10. Survey participants were also given the opportunity to rate satisfaction with their health care providers working in their interest. Child survey participants had statistically significant improvement from Wave 1 to Wave 2. There was no change in reported satisfaction score for adults.

For Domain 2, Access to TCM, has been shown to have limited impact predominantly due to low uptake and participation. Both administrative and TCM data provided by the TCM Designated Provider Organization showed rates less than 5% while survey participants reported approximately 10% participation. Despite the lower than anticipated coverage, those who have participated report sustained satisfaction with the benefit.

1. *Referral source and participation levels with TCM will be tracked among enrollees*. Referral count had been declining until the operations of the Flint Registry. There was very limited data in administrative claims for evidence of TCM participation. The enrollee survey data did not document a statistically significant change over time in TCM participation.
2. *All TCM participants will have at least one re-assessment within one year of original assessment*. Because observed participation rates were lower than expected, it was difficult to discern re-assessment of TCM enrollees at one year. Data was insufficient to perform statistical testing.
3. *A greater proportion of TCM participants will have age-appropriate well child exams than the comparison*. Administrative claims data yielded numbers too low to conduct statistical tests to compare TCM participants against TCM non-participants; however, TCM participants appeared to have high rates for 3-6 years of age.
4. *A greater proportion of TCM participants will have completed age-appropriate developmental screening than the comparison.* Administrative claims data were insufficient to conduct statistical testing to compare TCM participants against TCM non-participants.

Domain 3, Improved Health Outcomes is supported by the data collected during the enrollee survey as well as administrative data. Most participants reported health status rankings as good, very good, or excellent. Responding enrollees further report increased confidence and resources to manage chronic conditions since enrollment.

1. *Enrollees will have higher completed age-appropriate immunization statuses than non-enrollees with similar individual and neighborhood characteristics.* There was no statistically significant difference of the HEDIS Childhood Immunization Combination

#10 in children 2 years of age between the FME cohort and the Comparison Group. The FME enrollees had significantly higher Adolescent Immunization Combination #2 rates compared to the Comparison Group.

2. *Enrollees who are pregnant will deliver infants with higher birth weights than non-enrollees with similar individual and neighborhood characteristics*. The difference in trend for low birthweight rate between FME enrollees and the Comparison Group was not statistically significant.
3. *Enrollees report an increase in their self-reported health status over the duration of their enrollment*. Child survey participants reported statistically significant increases in reports of overall and emotional/behavioral health status from Wave 1 to Wave 2. Statistically significant improvements in child physical health was reported from Wave 1 to Wave 3. Adult survey participants reported significant increases in physical health status from Wave 1 to Wave 2. No other changes were significant.

P4. *We will conduct a descriptive analysis of the proportion of children diagnosed with severe emotional disturbance and other developmental/learning disabilities including comparing rates to others with similar lead exposures*. Data was not available to compare enrollees to the Comparison Group. Survey data through all Waves 1-3 indicate fewer children were reported to need testing for learning problems and having behavioral/emotional problems.

P5. *Descriptive analysis of behavioral health conditions and supportive care among enrolled children (i.e., rate/proportion of children suspended or expelled)*. Suspensions/expulsions and grade progression were not available due to lack of access to Genesee Intermediate School District during the coronavirus pandemic. Both Flint and Saginaw City schools' enrollment has declined over the past decade. However, the proportion receiving special education services increased steadily for students in Flint compared to those in Saginaw. Per the enrollee survey, there was a statistically significant decrease in the proportion reporting their child was diagnosed with a behavioral/emotional problem from Wave 1 to Wave 2.

P6. *Descriptive analysis of educational delays among enrolled children (i.e., rate/proportion of children receiving special education services, i.e., individual education plans "IEPs", early preschool performance, and reading and math scores at end of grades 3, 4, and 5).* Child survey participants report a statistically significant increase in children attending school in the expected grade for their age. This observation will be further analyzed in future analyses to evaluate whether this finding reflects the cohort aging into school enrollment or a true improvement in school performance.

Preliminary analyses for **Domain 4**, Lead Hazard Investigation, remains in progress and are unavailable. External community reporting published in the 2021 Flint Lead Free Report indicates positive trends in service line replacement, decrease in water lead values, and number of environmental investigations completed.

1. *Enrollees without elevated blood lead levels and participating with TCM services will access lead hazard investigation services to the same degree as beneficiaries with elevated blood lead levels.* Relevant reporting was accessed via the Flint Lead Free 2019 and 2021 reports. Community reporting revealed that more investigations have been completed among a cohort of children without EBLL from 13% to 97%. Also, the number of environmental investigations has increased. The enrollee survey documented a decrease in the reports of children having EBLL over the 3 Waves.
2. *Beneficiaries found to be at risk for ongoing lead exposure will be referred for additional environmental investigation.* The enrollee survey reports several measures of lead exposure risk including water use, other exposures, and the status of pipe replacement. History of EBLL is also included on the child survey. No significant difference was documented in the proportion of child survey participants acknowledging pipe replacement. However, a statistically significant increase in the proportion of child survey participants denying EBLL was reported from Wave 1 to Wave 2. Adult survey participants had no statistically significant increase in the proportion denying pipe replacement over the 3 Waves.

The FME Waiver has been in operation for over five years and enrollment is less than originally estimated. The original MDHHS estimates approximated 15,000 individuals who would have been newly eligible for Medicaid coverage due to the expanded eligibility criteria and these persons were in addition to the estimated 30,000 in the geographic region and already insured by Medicaid. Over the five years, over 44,000 beneficiaries enrolled in FME for at least one month and over 21,000 beneficiaries enrolled for all five years. About 8,000 individuals became newly eligible for Medicaid and enrolled in the program. The total FME enrollment reached approximately 34,000 in 2017-2018 and has been decreasing over time which confirms MDHHS enrollment pattern reporting. We are unable to ascertain reasons that resulted in under-enrollment. One influence may be access to resources and organizations that served the Flint and Genesee County communities before federal programs such as FME were implemented. Another possibility is among those at the higher FPL limits, there may have been disinterest in FME enrollment due to stigma. Individuals who had the resources to relocate away from the affected geographic area may believe they had eliminated their potential risks as they were no longer exposed. There remain opportunities for eligible individuals to enroll in the waiver. The Flint Registry is fully operational and serves as a hub for managing referrals.

Despite encountering lower participation than originally envisioned, enrollees are benefiting as evidenced by administrative data, survey responses, and TCM key informant interviews. The evaluation team has documented increased utilization of some services such as well child visits and timeliness of prenatal care. This supports good clinical practice even in non-crisis situations. Enrollees report satisfaction with the waiver experiences. Those with chronic conditions

reported increased confidence and resources available to them for self-management. Thus, benefits to enrollees appear to extend beyond addressing only the potential lead impacts.

Preliminary results also suggest an increase in developmental and behavioral screening with trends observed in the FME cohort outperforming the Comparison Group. Not only is screening a preventive measure in communities faced with environmental lead exposure, but an opportunity for increased awareness for health providers and parents in socioeconomically compromised communities. Early treatment of developmental and behavioral issues is the key to mitigating long-term consequences. Parents of affected children, whose health outcomes from lead exposure may not appear until school age and puberty, are expected to have increased need of and uptake in services in the future and begin to utilize expanded services. It should be noted, that the amount of use of Flint tap water was sustained over time, but children and adults are using fewer filters and using it for drinking, cooking, and other ingestion purposes. This may indicate some trust in the Flint water as safe for use but warrants further investigation.

The TCM benefit was used to a lesser degree than anticipated. The highest estimate of uptake came from the enrollee survey indicating approximately 10% of participants using this in both survey waves. Although the engagement with this service was low, those that participate report satisfaction. In addition, both enrollees and case managers reported that rapport and trust are sustained, and most enrollees met with case managers in their homes pre-pandemic. However, in the advent of social distancing policies during COVID-19, TCM case managers utilized telehealth or telephone during the statewide shut-down orders.

The web-based version of the enrollee survey continued with good enrollee engagement. Several protections were put into place to ensure participants could only complete one survey and that non-waiver enrollees could not find the survey through internet search engines. This provided timelier data as well as reduced the amount of "bad data" that resulted from inattention to skip patterns that can occur on paper surveys. In Wave 1 of the survey, many participants provided an email address that was used in Waves 2 and 3. This supported a follow up rate of 65% and internet participation is the most frequent response after three waves.

Utilization appears to have been adversely affected by the coronavirus pandemic in the last year incorporating 5/1/20 – 4/30/21. Rates for preventive services have declined in these data. Similar patterns have been observed in other statewide reports such as statewide lead screening and Medicaid HEDIS reporting. The waiver's extension will provide an opportunity to obtain an additional year of data through 4/30/22 which may show a rebound of these types of services as has been reported by national reports. This pattern was noted from the pre-water switch, T1, timeframe through the post-water switch/post FME enrollment T3 timeframe ending 4/30/19. Several of the measures then experienced small decreases for the T3

timeframe ending 4/30/21. Of note, the decline in lead screening data was concerning resulting in suppression of data for that year while further investigation is conducted.

Despite the impacts of the coronavirus pandemic and associated government shut downs, the evaluation work continued through 2021. An additional year of T3 data covering service dates of 5/1/2020 through 4/30/2021 was incorporated. Due to the receptivity of the enrolled population to participate with online survey methodology, the survey continued for Wave 3 and reported here, and Wave 4 was distributed in late 2021. Results for Wave 4 will be reported in the final report. Although some data sources originally were specified to support the evaluation activity, these data were determined to be unavailable. However, local and state referent community reports containing similar proxy measures were identified and were incorporated. Strategies for increased uptake are needed. Nevertheless, those who are enrolled in TCM are engaged and benefiting from the waiver.

Interpretations, Policy Implications, and Interactions with Other State Initiatives

Clear and intentional coordination of Medicaid coverage with other programs and efforts to provide a full suite of ongoing services, e.g., prenatal services, behavioral health services, child development services and timely, preventative screening, and lead mitigation is needed for those affected by the Water Crisis. Holistic coordination of services is critical not only at the time of the event, but ongoing to sustain healthy behaviors.

An example of collaboration with other initiatives occurred with the environmental lead assessment activities. As of January 1, 2017, CMS and the State of Michigan worked together on a Michigan State Plan Amendment. The collaboration resulted in a five-year Title XXI state designed Health Services Initiative (HSI) to cover expanded lead abatement services in the impacted areas of Flint for children and pregnant women. Although not directly a medical benefit, this partnership supports the health and well-being of individuals. Medicaid also supports the referral of individuals for lead investigation by collaborating with outreach and engagement agencies in the affected region.

TCM key informant case managers indicated that ongoing training and education for expanded services of the FME waiver eligibility, particularly for referral making health personnel is still needed. It was also noted the referral process is often complicated. Thus, considerations might include offering comprehensive guidance to providers and community partners about eligibility for coverage, especially at higher income levels. Likewise, enrollees need education about specialized services (TCM) and what these services include and how to access them to address health effects possibly related to the water crisis. Of note, the current TCM policy restricts reimbursement for TCM services to in-person assessments. This restriction was not modified during the pandemic timeframe as for some other health care services. TCM Providers report ongoing provision of services through audio or visual telehealth options, yet no administrative claims were identified. This apparent discrepancy will be further investigated.

Lessons Learned and Recommendations

This interim report details findings from evaluation activities occurring between 2018 through 2021. It offers information that can improve the present evaluation, and future Medicaid Expansion evaluations for similar environmentally related health emergencies. This report incorporated data for a reporting timeframe significantly affected by the coronavirus pandemic, 5/1/20 – 4/30/21. This year's data provided evidence of declines of health care delivery among the enrolled cohort. The evaluation team looked to other statewide reporting and declining patterns were confirmed in more expansive statewide reporting. The waiver extension provides an opportunity to incorporate an additional year to the upcoming final report. This may provide evidence of service rebounding, particularly for preventive services and more intensive efforts to "catch-up" children on recommended services like lead screening and immunizations.

In this report, the evaluation team found that enrollment remains lower than expected. Reasons for this are not fully known. The pattern may reflect changes in the age cohorts or geography for those having ability to relocate. The engagement of those at FPL% over 200% remains small. Communication to the public, provider community, and potential enrollees may require ongoing multi-media dissemination. Thus, it is recommended that there be early and clear communication and education to the community and health providers about access methods and conditions of the expanded waiver eligibility along with ongoing training. Services early and up front will save the community, providers, and state systems long-term resources.

The approved service of TCM has been utilized much less than anticipated despite the reports of satisfaction from those who do engage. There may be several reasons for this observation. Those who have participated and experienced delays in being able to secure the referrals may be disclosing those negative experiences with others. This could potentially discourage participation among those considering the service. Another reason for lack of engagement was a degree of altruism. According to TCM providers, some enrollees resistant to participation expressed concern they would be taking services away from someone who had a more acute need. In addition, community services that aided residents during the height of the crisis and beyond may have resolved some issues that would be addressed by the expansion. The prevalence of TCM engagement and satisfaction appears to be stable with similar reporting in the enrollee surveys.

The enrollee survey conducted as part of this evaluation presented a unique opportunity to test various methods of survey participation. Participation with the survey provided evidence that Medicaid enrollees were interested and able to participate with online surveys.
The willingness of online interaction may represent opportunity for expanded outreach to a Medicaid population. Data suggest smart phones became more widely available as part of the Affordable Care Act and the Recovery Act which increased access to the internet for low-

income persons. However, parity is not yet met when compared to the general population. Nevertheless, web-based access to health services information and referrals may reduce barriers to accessing healthcare services. The use of web-based services can offer substantial cost savings for delivery of healthcare for federal and local health systems and should be considered.

The evaluation team found that the complexity of data entry via electronic health records for Medicaid enrollees was cumbersome. When implementing a comprehensive roll-out of a federal emergency benefit to address an environmental and health crisis, technical assistance in documentation and recording should be considered. This would improve access to more accurate reporting in relation to other state administrative data.

A full description of recommendations is limited at this time. The period of this interim report covers evaluation activities from 2018 through 2021. The final evaluation report will be submitted October 2022. The additional of another year's worth of data may change the interpretations of the provisional data reported here. The impact of the pandemic appears to have impacted access to and receipt of preventive health services in the most recent reporting year. The extra year of data when pandemic restrictions were being relaxed may provide evidence of "catch-up" care or pent-up demand. Despite the decline in services during the most recent year, currently available data suggest that the waiver has had success in meeting the overall stated goal.

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Appendix 1: Matrix of Evaluation Domains including Hypotheses and Measures

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
DOMAIN 1: Access to Care			
H1.1: A greater proportion of enrollees will obtain age-appropriate well-child exams compared to others with similar lead exposures.	1. Well Child Visits in the First 15 months of Life	National Committee for Quality Assurance/NQF 1392	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
	2. Well Child visits in the Third, Fourth, Fifth and Sixth Years of Life	National Committee for Quality Assurance/NQF 1516	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
	3. Adolescent Well-Care Visits	National Committee for Quality Assurance	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
H1.2: A greater proportion of enrollees will receive age-appropriate developmental screening/assessments compared to others with similar lead exposures	1. Developmental Screening in the First Three Years of Life	Oregon Health & Science University /NQR 1448	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
	2. Socio-emotional/ Behavioral Screening for Children 4-17 years of age	n/a	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
H1.3: A greater proportion of enrollees will receive age appropriate lead testing compared to others with similar lead exposures	1. Lead Screening in Children	National Committee for Quality Assurance	Administrative claims/encounters in the MDHHS Health Services Data Warehouse

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
H1.4: A greater proportion of enrollees with high blood lead levels will receive re-testing at the appropriate intervals compared to others with similar lead exposures	1. Follow-up of elevated blood lead level	Early and Periodic Screening, Diagnostic, and Treatment (EPSDT)-CMS/American Academy of Pediatrics	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to lead screening and TCM monitoring data
H1.5: Enrollees who are pregnant will have more timely prenatal and postpartum care compared to others with similar lead exposures.	1. Timeliness of Prenatal Care	National Committee for Quality Assurance/NQF 1517	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Vital Records
	2. Postpartum Care	National Committee for Quality Assurance/NQF 1517	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Vital Records
H1.6: A greater proportion of enrollees who are pregnant will have recommended lead testing compared to others with similar lead exposures	1. Lead screening in pregnancy	American Congress of Obstetricians and Gynecologists	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Vital Records data
H1.7: A greater proportion of enrollees will participate with home visiting services compared	1. Maternal Infant Health Program Participation	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to MIHP visit and TCM monitoring data

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
to others with similar lead levels.			
H1.8: Enrollees will attest to improved access to health care as a result of the expanded coverage.	1. Enrollee Attestation for Improved Access to Care	Agency for Healthcare Research and Quality – Consumer Assessment of Healthcare Providers and Systems (AHRQ-CAHPS) Question Modification	Enrollee survey responses
H1.9: Enrollees will report satisfaction with their ability to access health care as a result of the expanded coverage.	1. Enrollee satisfaction with Medicaid expansion coverage	Agency for Healthcare Research and Quality – Consumer Assessment of Healthcare Providers and Systems (AHRQ-CAHPS) Question Modification	Enrollee survey responses
DOMAIN 2: Access to Targeted Case Management			
H2.1: Referral source and participation levels with TCM will be tracked among enrollees	1. Referral Source for TCM	MI defined measure	TCM documentation visit data
	2. TCM Participation	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to TCM billing/documentation
H2.2: All TCM participants will have an annual assessment conducted.	1. Annual TCM assessment	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to TCM billing/documentation

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
H2.3: A greater proportion of TCM participants will have age-appropriate well child exams compared to TCM non-participants	1. A greater proportion of TCM participants will have age-appropriate well child exams compared to TCM non-participants	National Committee for Quality Assurance /NQF 1392	TCM Program documentation linked to Administrative claims/encounter data available through the MDHHS Health Services Data Warehouse
H2.4: A greater proportion of TCM participants will have completed age-appropriate developmental screening compared to TCM non-participants	1. Impact of TCM in assuring enrollees obtain age-appropriate developmental screenings.	Oregon Health & Science University/NQF 1448 and new evaluation measure (socio-emotional/behavioral screening)	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to TCM billing/documentation visit data
DOMAIN 3: Improved Health Outcomes			
H3.1: Enrollees will have higher completed age-appropriate immunization statuses compared to others with similar lead exposures	1. Childhood Immunization Status	National Committee for Quality Assurance/NQF 0038	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
	2. Immunizations for Adolescents	National Committee for Quality Assurance/NQF 1407	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
H3.2: Enrollees who are pregnant will deliver infants with higher birth weights compared to others with similar lead exposures	1. Low Birth Weight Rate	Agency for Healthcare Research & Quality/NQF 0278	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Vital Records

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
H3.3: Enrollees report an increase in their self-reported health status over the duration of their enrollment.	1. Enrollee Self-Reported Health Status	AHRQ/CAHPS Question Modification	Enrollee survey responses
	2. Enrollee Self-Reported Efficacy of Chronic Condition Management	Adult and Pediatric Condition Management Self-Efficacy (ex. Asthma Control Test)	Enrollee survey responses
PROVISIONAL H3.4: Descriptive analysis of the proportion of children diagnosed with severe emotional disturbance and other developmental/learning disabilities including comparing rates to others with similar lead exposures.	1. Proportion of enrollees having diagnosis code(s) of interest	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse
PROVISIONAL H3.5: Descriptive analysis of behavioral health conditions and supportive care among enrolled children.	1. Prevalence of behavioral health conditions among enrolled children 2. Count of children enrolled in Early Childhood Programs 3. Proportion of students in Kindergarten who	MI defined measure	Enrollee survey responses ~~MDE Data~~ Summary data available through MI Schools Dashboards

Hypotheses	Measures	Steward/NQF #	Targeted Data Source(s)
	participated in Early Childhood Programs		
PROVISIONAL H3.6: Descriptive analysis of educational delays among enrolled children.	1. Prevalence of educational delays among enrolled children 2. Counts of children remaining in same grade 3. Educational Progress Standardized Testing (M-STEP, MI-Access)	MI defined measure	Enrollee survey responses ~~MDE Data~~ Summary data available through MI Schools Dashboards
DOMAIN 4: Lead Hazard Investigation			
H4.1: Enrollees without elevated blood lead levels and participating with TCM services will access lead hazard investigation services to the same degree as beneficiaries with elevated blood lead levels.	1. Prevalence of Lead Hazard Assessment/Investigation	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Blood lead levels
H4.2: Beneficiaries found to be at risk for ongoing lead exposure will be referred for additional environmental investigation	2. Prevalence of Lead Hazard Follow-up Investigation	MI defined measure	Administrative claims/encounters in the MDHHS Health Services Data Warehouse linked to Blood lead levels

Appendix 2: Approved Evaluation Plan

Flint Expansion Evaluation Final2_CM

Appendix 3: Enrollee survey Summary Report and Materials


FME_Wave 1SurveyReport_1_6_2(


List of FME W1-W3 Survey Tables_033120


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cover letter_Flint_benie_chil


prenotif_Flint_benie_adult.pdf


cover letter_Flint_benie_adu


Reminder_SurveyMail1.pdf


Nonresponder_SurveyReminderLetter_Mail


Child - Flint - WAVE 1 Final.pdf


Child - Flint - WAVE 2 Final.pdf


Child - Flint - WAVE 3 Final.pdf


Child - Flint - WAVE 4 Final.pdf


Adult - Flint - WAVE 1 Final.pdf


Adult - Flint - WAVE 2 Final.pdf


Adult - Flint - WAVE 3 Final.pdf


Adult - Flint - WAVE 4 Final.pdf

Appendix 4: TCM Provider Key Informant Summary Report and Materials


TCM_ProviderSurvey_phone.pdf


TCM Medicaid Provider Policy.pdf


kosf_KII_summary_W1-3_03312022_final.pdf

Appendix 5: MSU Human Research Protection Program – Determination Letter

MSU HRPP
Determination Letter.

Appendix 6: Flint Lead Free 2017 and 2021 Reports, Flint Registry

Lead-Free-Report-V5.pdf

Flint-Lead-Free-Report-2021.pdf

Appendix 7: 2018 – 2021 Results Summary

Appendix 7
03_31_22.pdf

Appendix 8: Comparison Group Selection

Appendix 8
Comparison group se