Michigan Department of Health and Human Services (MDHHS) WIC Division: Evaluation of WIC Telehealth Service Delivery for High-Risk Clients Using Zoom and ONE Platforms

MI.1. Technical Appendix

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WIC Michigan

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MI.1.1 THIS-WIC Study Framework

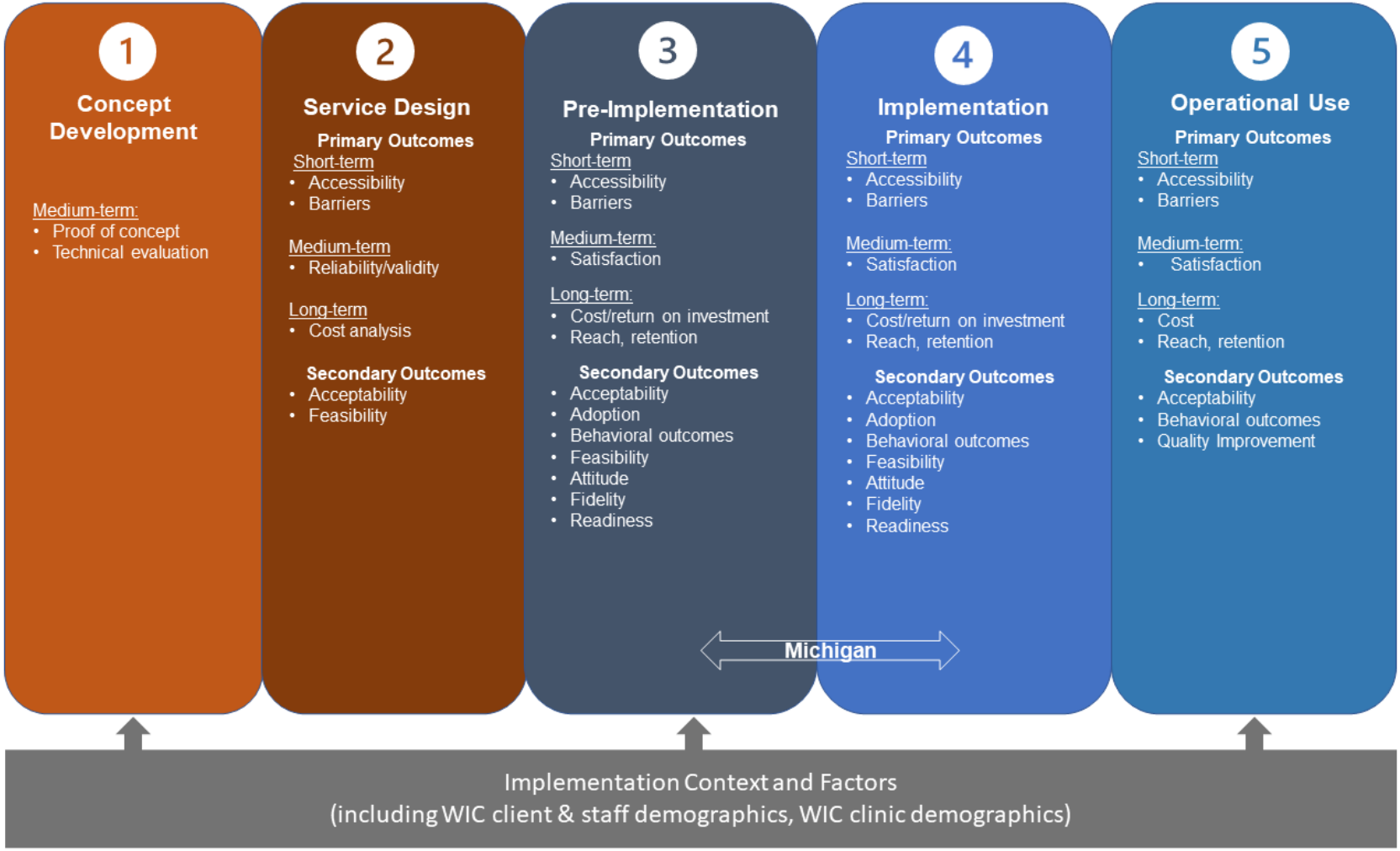
The U.S. Department of Agriculture (USDA)/Tufts Telehealth Intervention Strategies for the Supplemental Nutrition Program for Women, Infants, and Children (THIS-WIC) used the five-stage model for comprehensive research on telehealth developed by Fatehi and colleagues[1] to guide the overall design of a telehealth research program (see **Figure MI.1.1**).

- Stage 1 (concept development): Propose a technology-based solution to a health problem; this stage may include a needs analysis, proof of concept, and a technical evaluation of the concept.
- Stage 2 (service design): Study feasibility and accessibility to determine how the service delivery model should be modified to accommodate the proposed telehealth intervention.
- Stage 3 (pre-implementation): Study the telehealth solution under a controlled environment to assess efficacy.
- Stage 4 (implementation): Study the telehealth solution in real-world settings to assess effectiveness.
- Stage 5 (operational use): After implementing a telehealth intervention, focus on operational use and sustainability of the solution.

Michigan's (MI's) project spanned Stages 3 and 4, as MI worked with Nutrition Matters to develop and customize the platform for the state and piloted it with their local agencies.

In the context of THIS-WIC, the model mapped a multistage journey from developing a telehealth solution to assessing an established telehealth service. The model's internal consistency results from previous observations of the progression of telehealth projects in the telehealth field. Fatehi and colleagues[1] noted that telehealth research evaluations may not need to include all elements or stages, particularly where comparable services have been rigorously assessed.

Figure MI.1.1 THIS-WIC Five-Stage Model for Comprehensive Telehealth Research and Priority Areas



MI.1.2 WIC Agencies Participating in THIS-WIC Evaluation

MI selected local agencies to implement the telehealth solution based on prior documented challenges of retaining qualified professionals. MI also factored in the RD/IBCLC staff-to-client ratio, barriers to WIC services, and current health outcome disparities in local agencies across the state while selecting intervention agencies. MI matched intervention agencies (n=9) with comparisons agencies (n=9) with regards to the caseload and client characteristics such as race/ethnicity. During implementation, one of the nine intervention agencies withdrew from the project; the remaining eight agencies planned to deliver telehealth services as planned while the nine comparison agencies offered usual care (phone or in-person) appointments. **Table MI.1.1** lists the local agencies involved in the evaluation.

Table MI.1.1 List of WIC Agencies in the Intervention and Comparison Agencies in MI

Intervention Agencies	Comparison Agencies
Calhoun (2)[a]	Berrien (3)
Central MI District Health Department (DHD) (7)	Branch-Hillsdale-St. Joseph Community Health (4)
City of Detroit (13)	Chippewa County Health Department (1)
DHD #4 (4)[b]	DHD #10 (11)
InterCare (10)	DHD #2 (5)
Keweenaw Bay (KBIC) (2)	Detroit Urban League (8)
LMAS (4)	Jackson (1)
Washtenaw (6)	Mid MI CAA (1)
Western UP (5)	Sanilac (1)

[a] Numbers in parentheses represent the number of clinics under each local agency.
[b] Agency withdrew after implementation began.

Table MI.1.2 shows the geographic location, number of staff, number of clients served, as well as the race/ethnicity of clients served at intervention and comparison agencies. As seen, two intervention agencies were in rural areas and one comparison agency was in a rural area. There was considerable diversity in the agency size, as measured by the number of staff and clients served across the intervention and comparison agencies. Finally, there was not considerable variability in race/ethnicity of clients served across the intervention and comparison agencies, as the majority of clients identified as white in most clinics.

Table MI.1.2 Local WIC Agency and Client Characteristics of Intervention and Comparison Agencies

	Intervention Agencies								
Characteristic	**Central MI DHD**	**Western UP**	**DHD #4[a]**	**LMAS**	**Keewenaw Bay (KBIC)**	**Washtenaw**	**Calhoun**	**City of Detroit**	**InterCare**
Number of counties	5	5	4	4	2	1	1	1	9
Urbanicity	rural/urban	urban	urban	urban	rural	urban	urban	urban	urban
Number of staff	45	11	6	1-	3	15	9	71	30
Caseload	57,585	15,710	19,229	9,448	2,305	54,813	50,342	286,540	130,602
Families	3,122	792	1,044	511	126	2,926	2,725	15,218	6,837
Pregnant	440	118	151	73	24	387	377	1,748	882
Breastfeeding	252	101	92	36	11	311	210	1,061	601
Non-breastfeeding postpartum	296	66	102	44	10	253	279	2,125	670
Infants	1,020	261	346	157	38	1,009	901	6,012	2,387
Children	2,790	763	912	479	109	2,608	2,428	12,925	6,344
High-risk	1,135	262	431	148	28	875	836	4,474	1,183
Race/Ethnicity of Clients Served (%)									
AI/AN	1.2	0.4	0.1	2.6	75.2	1.4	0.1	0.1	2.1
Asian	0.2	0.7	0.1	0.1	0.0	2.0	5.5	1.1	3.9
Black/AA	1.0	1.3	0.6	0.8	0.5	39.6	18.7	72.6	3.9
Hispanic	5.0	2.6	3.1	2.6	5.9	11.6	9.0	16.7	29.8
NH/PI	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	10.6
White	90.5	91.3	91.2	68.9	6.5	40.5	60.7	23.2	82.3

(continued)

Table MI.1.2 Local WIC Agency and Client Characteristics of Intervention and Comparison Agencies (continued)

Characteristic	Comparison Agencies								
	Branch-Hillsdale-St. Joseph Community Health	Mid MI CAA Clinic	DHD#2	Chippewa County Health Department	Sanilac	Berrien	Jackson	Detroit Urban League	DHD #10
Number of counties	3	1	4	1	1	1	1	1	11
Urbanicity	urban	urban	rural/urban	urban	urban	urban	urban	urban	rural
Number of staff	19	8	17	9	6	12	17	44	22
Caseload	55,487	17,855	20,570	11,205	10,570	45,676	52,949	175,957	91,302
Families	2,914	1,167	1,105	599	557	2,427	2,766	9,477	4,868
Pregnant	410	175	157	89	92	334	408	1,145	650
Breastfeeding	251	109	73	58	42	235	214	484	454
Non-Breastfeeding postpartum	290	133	105	53	62	261	301	1294	425
Infants	1,013	436	340	186	202	891	970	3,558	1,571
Children	2,660	1,044	1,038	547	483	2,083	2,518	8,182	4,508
High-risk	738	347	223	187	116	805	993	3,233	345
Race/Ethnicity of Clients Served (%)									
AI/AN	0.1	0.1	0.1	23.8	0.1	0.8	0.2	0.1	0.4
Asian	0.1	0.3	0.0	0.5	0.1	0.9	0.2	0.5	0.2
Black/AA	1.0	1.6	0.3	0.4	0.1	36.5	13.3	78.3	1.3
Hispanic	15.1	4.4	5.7	5.2	6.2	9.4	7.8	6.2	13.4
NH/PI	0.0	0.6	0.0	0.0	0.0	0.5	0.0	0.1	8.0
White	90.7	91.1	91.6	45.7	95.9	53.7	67.8	16.8	90.1

[a] Agency withdrew after implementation began.
NOTES: AI/AN = American Indian or Alaska Native; Black/AA = Black or African American; NH/PI = Native Hawaiian or Other Pacific Islander

MI.1.3 Data Sources for THIS-WIC Evaluation

Table MI.1.3 summarizes the data sources used for the THIS-WIC evaluation in MI.

Table MI.1.3 Description of Data Sources for Telehealth Evaluation

Data Source	Description	Developed By	Collected By
MIS Data	Caseload and client characteristic data. Aggregate data across intervention and comparison agencies	State Agency	State Agency
Telehealth Metadata	Telehealth usage and engagement metrics for ONE	Telehealth Vendor	State Agency
Surveys: Client & Staff	Telehealth satisfaction, quality of telehealth interaction, and whether telehealth solution addressed known barriers to WIC participation	THIS-WIC	State Agency
Key Informant Interviews	Telehealth experience of state and local agency stakeholders	THIS-WIC	THIS-WIC
Implementation Data	Fidelity to the intervention protocol and implementation strategies	State Agency and THIS-WIC	State Agency
Cost Data	Source of information on startup and ongoing costs related to telehealth adoption, implementation, and sustainability	THIS-WIC	THIS-WIC & State Agency

MI.1.3.1 Telehealth Solution Implementation Data

Implementation data were collected using two methods: staff implementation surveys developed and administered by the MI State agency and responses to the Implementation Tracking Tool for startup (pre-implementation), midway, and endpoint or late phase of implementation. See **Appendix MI.3** for data collection instruments.

Quarterly Staff Implementation Surveys

MI State agency fielded quarterly surveys on implementation of telehealth solution with WIC local agency staff. Local agency intervention staff provided feedback on their experience using ONE during remote service delivery including appointment length, content, and quality, and overall staff perceptions of ONE, and State agency staff provided training and support.

MI.1.4 Client Survey Sample Size, Response Rate, Characteristics, and Representativeness

Information describing the sociodemographic characteristics and WIC participation for survey respondents was derived from the THIS-WIC Client Survey and MIS. Variables from the survey included respondent's race/ethnicity, the total number of years the household has received WIC services, location of residence, and the respondent's average daily consumption of fruits and vegetables. The MIS record data closest to the appointment date were extracted for the following variables: presence of WIC client with high-risk status in the household, household

size, annual household income, written language used at home (English, Spanish, other), and respondent's years of education.

MI.1.4.1 Client Survey Sample Size

High-risk WIC clients who received nutrition counseling or breastfeeding support during a remote appointment were eligible to take part in the evaluation. Respondents had to be 18 years of age or older, fall into one or more of the following categories: pregnant, non-breastfeeding postpartum, breastfeeding, or the parent/guardian of a participating infant or child in the WIC program. **Table MI.1.4** presents the caseload and target response rate for each phase, based on the total caseload at intervention and comparison agency. Although an increase of 10 points was hypothesized to be practically important, the actual difference could be smaller in many cases. For instance, a required sample size would be inflated by about 5 times if the actual difference is only about 4. Sample sizes based on two hypothetical response rates (5% and 10% which are typical for online survey) are also provided for reference.

Table MI.1.4 Caseload and Target Response Rate for Client Survey in MI[a]

Local Agency	Caseload	N if diff =10, per phase	N if diff =4, per phase	N with 5% response rate	N with 10% response rate
Intervention Agencies					
Calhoun	1,046	8	45	53	105
Central MI DHD	1,387	10	60	70	139
City of Detroit	5,535	40	238	277	554
DHD# 4[b]	523	4	23	27	53
InterCare	1,784	13	77	90	179
Keweenaw Bay (KBIC)	39	1	2	2	4
LMAS	184	2	8	10	19
Washtenaw	1,186	9	51	60	119
Western UP	363	3	16	19	37
Comparison Agencies					
Berrien	1,040	8	45	52	104
Branch-Hillsdale-St. Joseph	989	8	43	50	99
Chippewa County Health Department	245	2	11	13	25
DHD #10	799	6	35	40	80
DHD #2	296	3	13	15	30
Detroit Urban League	3,717	27	160	186	372
Jackson	1,207	9	52	61	121
Mid MI CAA	456	4	20	23	46
Sanilac	158	2	7	8	16
TOTAL	20,954	159	906	1,056	2,102

[a] Caseload data are for FY2020.
[b] Agency withdrew after implementation began.

MI.1.4.2 Client Survey Invitations and Response Rate

Following their WIC appointment, staff at participating intervention and comparison agencies sent an invitation to clients, inviting them to complete a survey about their experience with the appointment. As seen in **Table MI.1.5**, 13,550 clients were invited, and 1.86 percent consented to complete the survey. Of those who consented, 100 percent completed the survey and 74.3 percent were successfully linked with the MIS identifier. Response rates are provided for all who completed the survey, including those respondents who declined Zoom appointment (n=63).

Table MI.1.5 Client Survey Invitations, Consents, and Survey Completion in MI

Survey Status	Definition	Calculation	%
Invitations sent[a]	Email with link to survey	13,550	n/a
Response	Consents/Invitations	253/13,550	1.86
Completion[b]	Completes/ Consents	253/253	100
Match[c]	MIS Matches/Consents	188/253	74.3

[a] Survey links were sent based on completion of an eligible appointment during the implementation period. Survey responses were not required after screening and consent.
[b] Complete was defined as response to the eight items to assess satisfaction with telehealth services.
[c] Match was defined as the ability to link WIC family level administrative data to survey respondent.

MI.1.4.3 Sociodemographic Characteristics of Client Survey Respondents

Table MI.1.6 presents the characteristics of Client Survey respondents in MI. Of the 230 survey respondents, 122 (53%) were in intervention agencies and 108 (47%) were in comparison agencies. Aside from race/ethnicity and place of residence, none of the household characteristics were significantly different between the intervention and comparison agencies. Approximately half of the survey respondents (49.7%) were in the age range of 26 to 35. The intervention agencies included a slightly higher percentage of respondents in the 18–25 years age bracket than the comparison agencies (27.3% vs. 21.7%). The majority of respondents (59.6%) had some high school education (grades 9 to 12), and 37.2% percent had completed some college (1 to 5 years).

Survey respondents were primarily non-Hispanic White (45.2%) and almost 36 percent identified as non-Hispanic Black/African American. Overall, 10 percent of survey respondents identified as Hispanic/Latino. The comparison agencies included a higher proportion of non-Hispanic White respondents compared to the intervention agencies (56.5% vs. 34.4%) and a lower proportion of non-Hispanic Black/African American respondents (25% vs. 45.8%). Overall, 96 percent of survey respondents reported the use of English at home (written). The median household size was three members for the intervention agencies and four members for the comparison agencies. The median annual household income of $10,600 for the intervention agencies was slightly lower than the median annual household income of $12,000 for comparison agencies. Overall, 45.1 percent of survey respondents lived in a rural area, 40.1 percent lived in an urban area, and the remaining 14.8 percent lived in a suburban area.

Table MI.1.6 Sociodemographic Characteristics of Client Survey Respondents in MI

Variable	Overall	Intervention	Comparison	p-value[d]
	%			
Age[a]	N=191	N=99	N=92	0.0799
18 to 25	24.6	27.3	21.7	
26 to 35	49.7	44.4	55.4	
36 to 45	22.0	25.3	18.5	
46 to 55	2.1	0.0	4.3	
56 to 65	1.0	2.0	0.0	
66+	0.5	1.0	0.0	
Education[b]	N=95	N=49	N=45	0.4131
1 to 8 years	1.1	2.0	0.0	
9 to 12 years	59.6	57.1	62.2	
1 to 5 years of college	37.2	36.7	37.8	
1 or more years of grad school	2.1	4.1	0.0	
Race/ethnicity[a]	N=188	N=96	N=92	0.0194*
Non-Hispanic Black/African American	35.6	45.8	25.0	
Non-Hispanic White	45.2	34.4	56.5	
Hispanic/Latino	10.1	8.3	12.0	
Non-Hispanic American Indian/Alaska Native	1.6	3.1	0.0	
Non-Hispanic Asian	1.6	1.0	2.2	
Non-Hispanic Native Hawaiian/Pacific Islander	1.1	1.0	1.1	
Non-Hispanic Two or more races	3.7	4.2	3.3	
Non-Hispanic Other	1.1	2.1	0.0	
Language used at home (written)[b]	N=176	N=96	N=80	0.4489
English	96.0	96.9	95.0	
Spanish	1.7	2.1	1.3	
Other	2.3	1.0	3.8	
Place of residence[a]	N=182	N=89	N=93	0.5341
Rural	45.1	48.3	41.9	
Suburban	14.8	15.7	14.0	
Urban	40.1	36.0	44.1	
Household size[b]	N=175	N=96	N=80	0.1037
Median, [IQR][c]	4.0 [3.0, 4.0]	3.0 [3.0, 4.0]	4.0 [3.0, 5.0]	
Household income ($)[b]	N=176	N=96	N=79	0.4822
Median, [IQR][c]	12,000.0 [700.0, 29,120.0]	10,600.0 [650.0, 24,000.0]	12,000.0 [1,100.0, 35,360.0]	

Sources: [a] THIS-WIC Client Survey; [b] WI MIS
[c] IQR = Interquartile range

[d] P-values are based on chi-square tests for categorical variables and two-sample median tests for continuous variables. For race, age, language used at home (written), and education, 25% or more of the cells have expected counts less than 5 so chi-square may not be a valid test.
* p<0.05.

MI.1.4.4 Length of WIC Tenure and High-Risk Status of Client Survey Respondents

As seen in **Table MI.1.7**, 43.3% of respondents had received WIC services for less than a year and about a third of respondents had received WIC services for more than three years. The distribution of respondents in both agencies is comparable. About 82 percent of respondents had a high-risk WIC participant in their household. The distribution of the respondents in both intervention and comparison agencies is comparable. Slightly less than half of respondents had received WIC services for less than a year and about a third of respondents had received WIC services for more than three years. About 82 percent of respondents had a high-risk WIC participant in their household.

The aggregate MIS data and Client Survey data were used to generate balance tables and assess the representativeness of the survey respondents. This analysis entailed comparing the survey respondents' sociodemographic characteristics, duration of WIC participation, and high-risk status with those of the overall and high-risk clients at the intervention and comparison agencies.

Table MI.1.7 Length of WIC Tenure and High-Risk Status of Client Survey Respondents in MI

Variable	Overall	Intervention	Comparison	p-value[b]
	%			
In total, how many years have you received WIC services? Would you say it has been ...	N=187	N=96	N=91	0.5494
<1	43.3	40.6	46.2	
1-2	23.5	22.9	24.2	
3-4	16.0	19.8	12.1	
5+	17.1	16.7	17.6	
Household high-risk status[a]	N=176	N=96	N=80	0.8305
Yes	81.8	81.3	82.5	
No	18.2	18.8	17.5	

Source: MI MIS
[a] High-risk status is a dichotomous indicator coded “1” if a WIC participant in the household was assigned one of eight high-risk status codes at their most recent WIC appointment.
[b] p-value based on chi-square tests.

MI.1.4.5 Client Survey Representativeness

The aggregate MIS data and Client Survey data were used to generate balance tables and assess the representativeness of the survey respondents. This analysis entailed comparing the survey respondents' sociodemographic characteristics, duration of WIC participation, and high-

risk status with those of the overall and high-risk clients at the intervention and comparison agencies. The administrative caseload data presented in the balance tables are aggregate MIS data spanning Q2/2022 to Q1/2023; quarterly disaggregated balance tables are in **Appendix MI.4**.

As seen in **Table MI.1.8**, in general, consistent patterns were noted for age distribution of WIC clients in the administrative (overall and high-risk) caseload and in Client Survey respondents; slightly more than half of the clients were between 26- and 35-year-old in both the intervention and comparison agencies. Differences were noted in the education attainment; a higher percentage of survey respondents from the intervention agencies had less than 7 years of education than the administrative caseload. Additionally, the survey respondents from intervention and comparison agencies had higher education attainment than those in the overall administrative caseload.

Table MI.1.8 Comparison of Administrative Records and Respondents for Age and Education for Intervention and Comparison Agencies, Average Q2/2022 – Q1/2023

	Intervention Agencies		Comparison Agencies	
	Administrative Data[a]	Survey Sample[b]	Administrative Data[a]	Survey Sample[b]
	High-risk only	High-risk only	High-risk only	High-risk only
Q2/2022–Q1/2023	%		%	
Age	N=896	N=24	N=1481	N=21
18-25 Years	30.88	27.08	32.25	25.61
26-35 Years	52.23	54.17	55.10	53.66
36-45 Years	16.72	17.71	12.53	18.29
46-55 Years	0.00	0.00	0.00	2.44
56-65 Years	0.00	1.04	0.00	0.00
66+ Years	0.17	0.00	0.12	0.00
Education	N=904	N=14	N=1501	N=13
0-7 Years	2.16	14.46	0.73	0.00
8-11 Years	18.75	39.76	17.27	19.88
12 Years	48.95	28.92	46.58	39.13
13-15 Years	22.84	9.64	27.09	18.63
16+ Years	7.30	14.46	8.33	22.36

[a] Sources: Michigan MIS data; [b] THIS-WIC Client Survey
NOTES: Excludes two agencies that dropped out in the first quarter.

As seen in **Table MI.1.9**, the survey respondents from the intervention and comparison agencies included a greater proportion of Asians and American Indians than noted in the administrative caseload. The distribution of household sizes was generally similar for the administrative caseload and survey respondents.

Table MI.1.9 Comparison of Race, Ethnicity, and Household Size of Client Survey Sample with Administrative Records for Intervention, and Comparison Agencies in MI

	Intervention Agencies		Comparison Agencies	
	Administrative Data[a]	Survey Sample[b]	Administrative Data[a]	Survey Sample[b]
	High-risk only	High-risk only	High-risk only	High-risk only
Q2/2022–Q1/2023	%		%	
Race/ethnicity	N=2,449	N=33	N=3,620	N=29
White	36.62	31.06	52.10	53.45
Black	56.01	45.45	39.48	27.59
American Indian	1.32	7.58	0.62	3.45
Asian	1.08	3.03	1.38	6.90
Pacific Islander	0.15	3.03	0.12	0.00
Other	4.81	9.85	6.29	8.62
Ethnicity	N=2,449	N=28	N=3,620	N=26
Hispanic (Yes)	13.60	10.81	8.14	11.65
Household size	N=904	N=31	N=1,501	N=28
3 or less members	46.40	48.13	48.36	34.51
4 members	21.54	25.67	24.30	23.01
5 members	15.43	11.76	13.27	17.70
6 or more members	16.62	14.44	14.07	24.78

[a] Sources: MI MIS data; [b]THIS- WIC Client Survey
NOTES: Excludes two agencies that dropped out in the first quarter.

As shown in **Table MI.1.10**, for both intervention and comparison agencies, high-risk infants represented the largest percentage of clients in the administrative data and sample, followed by children. Intervention agencies had slightly higher percentages of high-risk pregnant women than the comparison agencies for both the administrative and the sample data.

Table MI.1.10 Comparison of Participant Category of Client Survey Sample with Administrative Records for Intervention and Comparison Agencies in MI

	Intervention Agencies		Comparison Agencies	
	Administrative Data[a]	Survey Sample[b]	Administrative Data[a]	Survey Sample[b]
	High-risk only	High-risk only	High-risk only	High-risk only
Q2/2022–Q1/2023	%		%	
Participant Category	N=2,449	N=30	N=3,620	N=24
Infant	33.47	30.58	29.79	28.72
Breastfeeding	4.66	7.44	7.22	7.45
Non-Breastfeeding	11.11	14.88	10.45	9.57
Child	29.61	29.75	28.73	26.60
Pregnant	21.16	17.36	23.80	27.66

[a] Sources: MI MIS data; [b]THIS- WIC Client Survey
NOTES: Excludes two agencies that dropped out in the first quarter

MI1.5 THIS-WIC Staff Survey Sample Size, Response Rate and Respondent Characteristics

MI.1.5.1 Sample Size and THIS-WIC Staff Survey Response Rate

All WIC staff and administrators engaged in delivering nutrition or breastfeeding counseling services for high-risk WIC clients at intervention agencies were invited to complete the Staff Survey. **Table MI.1.11** shows that thirty unique staff members completed the survey at each round. The number of staff invited and the number of staff who completed the early phase survey was 42 and 27, respectively (64.2% response rate). The number of staff invited and the number of staff who completed the late phase survey was 40 and 19, respectively (47.5% response rate).

Table MI.1.11 Number of Staff Who Were Invited and Responded to the Staff Survey in MI

WIC Agency	Early Phase		Late Phase	
	Invited	Responded	Invited	Responded
	Number of Staff			
Calhoun	3	2	3	1
Central MI DHD	5	3	5	5
City of Detroit	13	8	13	6
DHD #4[a]	3	2	-	-
InterCare	10	6	10	5
Keweenaw Bay (KBIC)	2	2	1	1
LMAS	3	4	3	0
Washtenaw	3	0	4	0
Western UP[b]	-	-	1	1
TOTAL	42	27	40	19
Overall response rate (%)	64.2		47.5	

Source: THIS-WIC Staff Survey
[a] Local agency withdrew from evaluation after implementation began.
[b] Local agency did not have staff using telehealth at start of implementation.

MI.1.5.2 Characteristics of Staff Survey Respondent

WIC agencies experience turnover and hire new staff, so the same survey was administered at both time points. The distribution of age, race/ethnicity, and WIC participation did not differ among early and late phase Staff Survey respondents (**Table MI.1.12**).

Table MI.1.12 Characteristics of Early- and Late-Phase Staff Survey Respondents in MI

Variables	Early Phase	Late Phase	p-value[a]
	%		
Age	N=24	N=19	0.978
18–25	4.0	5.3	
25–35	32.0	21.1	
36–45	20.0	21.1	
46–65	16.0	15.8	
56–65	24.0	31.6	
66+	4.0	5.3	
Race/Ethnicity	N=25	N=19	0.798
Hispanic	8.0	10.5	
Non-Hispanic Black or African American	4.0	0	
Non-Hispanic White	80.0	84.2	
American Indian or Alaska Native	4.0	0	
Asian	4.0	5.3	
Native Hawaiian or multi-racial	0.0	0.0	
Previous WIC participation	N=3	N= 3	0.717
Yes	12.0	15.8	

Source: THIS-WIC Staff Survey
NOTE: Statistics reported are column percentages.
[a] p-values are based on chi-square tests.

MI.1.5.3 WIC Role and Years of Experience of Staff Survey Respondents

As seen in **Table MI.1.13**, role, years of WIC experience, and travel patterns of WIC staff did not differ between the early and late phase surveys. WIC staff were primarily registered dietitians and breastfeeding support staff, and about 46 percent and 68 percent of early and late phase staff had worked in WIC for more than 12 years, respectively. About 70 percent of staff surveyed in the early phase traveled to provide service before the COVID-19 pandemic, whereas about 56 percent did so in the late phase.

Table MI.1.13 Role and Years of WIC Experience of Early- and Late-Phase Staff Survey Respondents in MI

Variables	Early Phase	Late Phase	p-value[a]
	%		
WIC role[b]	N=26	N=19	
CPA/CPPA	23.1	31.6	0.524
Registered dietitians	73.1	89.5	0.174
Breastfeeding roles (e.g., IBCLCs)	23.1	26.3	0.803
Local agency directors	15.4	0	0.073
Years worked in WIC	N=26	N=19	0.290
<2 years	7.7	15.8	
2–4 years	15.4	5.3	
5–8 years	7.7	5.3	
9–12 years	23.1	5.3	
12+ years	46.2	68.4	
Pre-COVID-19 travel to provide service	N=23	N=16	0.773
Yes	60.9	56.2	

Source: THIS-WIC Staff Survey
Statistics reported are column percentages.
[a] p-values are based on chi-square tests.
[b] Percentages do not add up to 100 because staff could select more than one role.

MI.1.6 Staff Key Informant Interview Sample Size and Response Rate

In the early phase, all staff who completed the Staff Survey and indicated they had used telehealth were invited to participate in the key informant interviews. Due to low response rate to the survey and key informant interviews in the early phase, in the late phase all staff who used the telehealth solution for high-risk nutrition appointments or breastfeeding support were invited to the key informant interview, regardless of their survey completion status. **Table MI.1.14** shows that the response rate for staff interviews was 28.6 percent in the early phase and 38.1 percent in the late phase.

Table MI.1.14 Number of Staff Who Were Invited and Participated in Key Informant Interviews in MI

WIC Agency	Early Phase		Late Phase	
	Invited	Responded	Invited	Responded
	Number of Staff			
Calhoun	1	1	2	1
Central MI DHD	-	-	3	3
City of Detroit	1	0	6	1
DHD # 4[a]	-	-	-	-
InterCare	4	1	4	0
Keweenaw Bay (KBIC)	-	-	-	-
LMAS	1	0	2	1
Washtenaw	-	-	3	1
Western UP[b]	-	-	1	1
TOTAL	7	2	21	8
Overall response rate (%)	28.6		38.1	

Source: THIS-WIC Staff Survey
[a] Local agency withdrew after implementation began.
[b] Local agency did not have staff using telehealth at start of implementation.

MI.1.7 Data Analysis

MI.1.7.1 Aggregate MIS Analysis

For MI, WIC administrative data included WIC client characteristics, certification information, nutrition and risk assessment, nutrition education, and WIC food benefit redemption. MI also linked the Client Survey identified with the client-level MIS data.

Aggregate MIS data were also used to examine agency-level trends in breastfeeding initiation and exclusive breastfeeding for the intervention and comparison agencies. Descriptive analyses were used to analyze the data and present the findings. All analyses were conducted in SAS 9.4. Crosstabulations and chi-square statistics were used to examine the differences between intervention and comparison agencies.

Aggregate MIS data were used to examine survey respondents' representativeness by comparing sociodemographic characteristics of the overall caseload with that of the survey respondents. It should be noted that while the analysis of linked MIS and the Client Survey data provides the most useful outcome variables, it is limited by sample size, depends on the representativeness of the sample, and is available only for the time periods covered by the sample.

Administrative data linked to survey respondents were also used to examine retention and benefit redemption among survey respondents. Crosstabulations and chi-square statistics were used to examine the differences between intervention and comparison agencies.

Retention: This analysis was restricted to Client Survey respondents who completed their surveys in the first 6 months of telehealth implementation. Retention was examined by tracking the proportion of Client Survey respondents (overall) who had available data on benefit redemption 6 months after their appointment.

Benefit Redemption: MI's MIS captures the percentage of WIC vouchers redeemed by participants. Benefit redemption was categorized as (a) <10%, (b) 10-90%, and (c) >90%. The proportion of WIC benefits redeemed by participants in the month following their appointment was compared for Client Survey respondents (overall and by participant type) from the intervention and comparison agencies.

Finally, aggregate MIS data were also used to examine clinic-level trends in outcomes for the intervention and comparison agencies. The analysis of aggregate data has the advantage of providing information about all WIC participants in the intervention and comparison agencies, and it provides some information about more time periods (including time periods before the intervention began). It is limited to the variables captured by the MIS. Descriptive analyses were used to analyze the data and present the findings. All analyses were conducted in SAS.

MI.1.7.2 ONE Implementation

Implementation Tracking Tool

Responses to the Implementation Tracking Tool were collected at the startup, midpoint, and endpoint of telehealth implementation. The 46 distinct strategies in the menu were grouped into eight conceptually relevant implementation categories, using the groupings developed by Waltz et al. (2016).[2] Although Waltz and colleagues had developed nine categories through concept mapping, "utilize financial strategies" category was not included in the THIS-WIC menu. **Table 2.12** lists the eight implementation categories and corresponding menu strategies. The analysis of implementation tracking menu involved tabulating the startup, midpoint, and endpoint status for each menu strategy to assess change. The startup measures were considered the implementation plan, and the change from startup to midpoint and endpoint measures were considered indicative of fidelity. In addition to understanding the fidelity of implementation, these data were also used to provide context for the staff and client-level outcomes.

Table MI.1.15 THIS-WIC Implementation Menu Categories

Implementation Category	Implementation Menu Strategy
Use evaluative and iterative	Assess for readiness and identify barriers and facilitators
	Conduct local needs assessment
	Audit and provide feedback
	Conduct small tests of change
	Develop a formal implementation blueprint
	Develop and organize quality monitoring systems
	Obtain and use WIC clients and family feedback
	Purposely reexamine the implementation
	Stage implementation scale-up
Provide interactive assistance	Centralize technical assistance
	Provide local technical assistance
Adapt and tailor to context	Promote adaptability
	Tailor strategies
	Use data experts
	Use data warehousing techniques
Develop stakeholder interrelationships	Conduct local consensus discussions
	Develop academic partnerships
	Build a coalition
	Capture and share local knowledge
	Identify and prepare champions
	Identify early adopters
	Inform local opinion leaders
	Organize WIC staff implementation team meetings
	Promote network weaving
	Recruit, designate, and train for leadership
	Use advisory boards and workgroups
	Use an implementation advisor
	Visit other sites
Train and educate stakeholders	Conduct educational meetings
	Conduct ongoing training
	Develop and distribute educational materials
	Make training dynamic
	Provide ongoing consultation
	Shadow other experts
	Use train-the-trainer strategies

(continued)

Table MI.1.16 THIS-WIC Implementation Menu Categories

Implementation Category	Implementation Menu Strategy
Support clinicians	Create new telehealth teams
	Develop resource sharing agreements
	Revise professional roles
	Facilitate relay of telehealth breastfeeding/nutrition data to staff
	Remind WIC staff and clients
Engage consumers	Intervene with WIC clients to enhance uptake and adherence
	Involve WIC clients and family members
Change infrastructure	Change record systems
	Change physical structure and equipment
	Change service sites
	Start a dissemination organization/committee

Data on use of telehealth solution at each local intervention agency level were collected directly in ONE or documented in MI's MIS system. The MI State agency team collected these data from the local agency and submitted tabulated data to THIS-WIC team quarterly during the intervention period. Descriptive analyses were conducted using Microsoft Excel (version 2308) to examine implementation.

MI.1.7.3 ONE Metadata

Metadata on telehealth solution usage were captured by the ONE software platform for each participating local agency. This included data on the number of pending, open active, open inactive, and closed accounts, the number of articles shared by staff and viewed by clients, and the number of recipes accessed by clients. MI State agency staff generated and provided quarterly data to THIS-WIC. Descriptive analyses were used to examine counts of resources used in each quarter of telehealth implementation. All analyses were conducted in Excel.

MI.1.7.4 Client Survey

The client outcomes evaluation examines the experiences of WIC participants who received WIC services and completed a Client Survey between Q1/2022 and Q2/2023. Nine agencies were assigned to the intervention agencies and nine to the comparison agencies. One intervention agency withdrew from the study after implementation and were excluded from the analysis. In addition, one intervention agency and two comparison agencies were excluded from the Client Survey data analysis because five or fewer WIC participants completed the survey. There were 122 survey respondents from intervention agencies and 108 from the agencies. All surveys were completed by an adult either to reflect WIC services they received for themselves (i.e., pregnant, postpartum, or breastfeeding women) or for their infant/child.

Breastfeeding Practices

Information from the MIS was used to summarize breastfeeding practices in households with an infant (age 0 to 12 months) during the intervention period. If the household included more than one infant during the intervention period, breastfeeding practices for the youngest infant were selected for analysis. Two breastfeeding variables were examined: whether the infant was ever breastfed and whether the infant was exclusively breastfed for at least 6 months.

Attitudes Toward the Telehealth Solution

Survey respondents in the intervention agencies who reported their appointment took place “at home” or “some other place” (i.e., not at a WIC clinic) were asked about their experience with their telehealth appointment. The number of statements (between 5 and 10) presented to each participant was determined by the type of telehealth services used for their appointment. All survey respondents were asked about their level of agreement with the following five statements:

1. I could hear the WIC nutrition educator clearly.
2. It was easy to figure out how to use and receive WIC services.
3. My WIC appointment was shorter than usual when receiving care.
4. The way I received WIC services was easier than going to a WIC clinic.
5. I would like to receive services the same way at my next WIC appointment.

Survey respondents who indicated that they had their appointment via telehealth were also asked about their level of agreement with these five additional statements:

1. The telehealth platform was simple to use for my WIC appointment.
2. I had trouble accessing the telehealth platform.
3. The telehealth solution content was in a language I can read.
4. I could see the WIC nutrition educator clearly during my most recent WIC appointment.
5. I could easily talk to the WIC nutrition educator during my recent appointment.

Each statement included a 5-item, Likert-type response option that ranged from “strongly disagree” to “strongly agree” except for the item, “the telehealth solution content was in a language I can read,” which had yes/no response options.

Client/Respondent Outcomes

Primary and secondary outcomes assessed the comparative advantage of the telehealth intervention. Primary outcomes are related to the mechanism used to deliver WIC services and include client satisfaction, accessibility, and barriers to participation. Secondary outcomes are related to client intentions to change dietary behaviors because of improved client engagement (due to improvements in service delivery).

Client Satisfaction. Eight items assessed client satisfaction; these items assessed the WIC participant's experience (e.g., was a good use of my time, was convenient) and perceptions of the WIC nutrition educator (e.g., was friendly, had good communication skills). These items demonstrated a high degree in inter-relationship (inter-item correlation, alpha = .93) and were treated as an index. Each item included a five-level, Likert-type response option that ranged from "strongly disagree" to "strongly agree." Summing up, the eight items produced index scores with a potential range of 20 – 100 points with higher scores indicating greater satisfaction.

Barriers. The Client Survey included several questions on availability and use of technology as well as administrative, individual level, and staff level barriers to accessing WIC services and ONE resources. Four questions on availability and use of technology asked about a computer and smartphone at home, mode of connecting to the internet, comfort with use of technology, and frequency of videoconferencing to connect with family and friends.

Five items asked about barriers to participation in the WIC appointment (e.g., appointment wait time, poor/no internet connection, staff diversity, and language). Each item included a four-level Likert-type response option that ranged from "frequently" to "never" with lower scores reflecting more experience with the barrier and higher scores reflecting less experience with the barrier.

Three items asked respondents about accessibility to the WIC appointment (e.g., transportation issues, childcare issues, difficulty getting time away from work). Each item included a four-level Likert-type response option that ranged from "frequently" to "never" with lower scores reflecting more experience with the accessibility issue and higher scores reflecting less experience with the accessibility issue.

Intentions to Change Dietary Behaviors. Three survey items asked respondents to respond to statements about their intentions to change diet-related behaviors following their WIC appointment. Using a five-level, Likert-type response option that ranged from "strongly disagree" to "strongly agree," with higher numbers indicative of greater levels of agreement, respondentss responded to statements about their intentions to (1) change how they eat; (2) change how they feed their family; and (3) make healthier food choices.

Analysis

Descriptive Statistics. Descriptive statistics include respondent and household demographics and behaviors and attitudes toward the telehealth intervention. Crosstabulations were used to examine categorical variables and the proportion among those who provided data is presented; missing values were excluded from the analysis. Descriptive analyses were undertaken to examine continuous variables; because the data on household income and household size were skewed, median and interquartile range (25th percentile–75th percentile) are reported. Significance tests compare caregiver demographics and household characteristics and behaviors between respondents in the intervention and comparison agencies. For categorical variables, chi-square tests for independence are presented. For continuous variables, the median test was used which examines whether the two samples come from the same population. This was done by assessing the distribution of sample scores around the median instead of comparing the actual median values.

Statistical Models. Analyses to assess participant outcomes employed hierarchical linear regression models comparing differences in means for intervention and comparison agencies. The models were estimated with the SAS PROC MIXED[3] procedure using restricted maximum likelihood (REML) and Type 3 F test to assess study hypotheses with statistical significance set at $P < 0.05$. Degrees of freedom for tests of intervention effects were determined using the Kenward and Rogers[4] (1997) method.

MI.1.7.5 Staff Survey

Descriptive analyses were undertaken to examine the Staff Survey data. For categorical and ordinal outcomes, chi-square tests were performed to examine differences in responses from early to late phase surveys. For ordinal/continuous outcomes, independent t-tests were performed to examine mean differences. Out of the 45 total responses, 26 were submitted in the early phase and 19 in the late phase. Among the 19, 14 of them were repeated responses. Due to this low number of repeated responses, the data were analyzed as if they were independent between the two phases. All analyses were conducted in Stata 18 (StataCorp LLC, College Station, TX, USA).

The Staff Survey has embedded logical skip patterns which might have further restricted the sample size based on users' responses. For example, out of the total 45 surveys, only 18 provided user perspectives on Zoom and ONE because these 18 responses were involved in providing either nutritional or breastfeeding support. The numbers further decreased to 15 for Zoom and 7 for ONE when the questions were only asked if the respondent had experience in using the corresponding telehealth modality. Caution should be executed when evaluating the analysis results of the Staff Survey user experiences and opinions.

MI.1.7.6 Staff Key Informant Interviews

All interviews were audio recorded and transcribed by Zoom verbatim in English only. Each transcript was reviewed for accuracy and corrected to reflect actual dialogue spoken, by listening to the audio recording.

Before undertaking analysis, three THIS-WIC team members created a preliminary codebook, with codes deductively informed primarily by the Consolidated Framework for Implementation Science Research (CFIR)[5] and the Evaluation Framework for Telemedicine.[6] Five trained qualitative researchers who conducted the interviews also coded the interviews.

A single codebook was used to code early and late phase interviews. The codebook included a description, inclusion and exclusion guidance, and an example quote for each code when relevant. To start, five researchers independently coded the same four transcripts from four different WIC state agencies. Coders met over video to compare codes, arrived at an agreement on differing codes through discussion, and updated the codebook to address inconsistencies or to add additional clarity.

Next, researchers established inter-rater reliability across four different transcripts. These four transcripts involved the WIC roles of two front-line nutrition staff (e.g., RD), one breastfeeding-focused staff (e.g., IBCLC), and one local agency director. Researchers coded each transcript

individually, ran coding comparisons against the primary coder, and discussed results. Coders discussed results until all codes reached a 90 percent agreement and a Kappa coefficient of at least .40 (fair to good judgment). Researchers conducted the same process for all four transcripts. As new researchers joined the project, the main coder facilitated the same reliability process with the previously established agreement NVivo files until coders reached the 90 percent agreement and Kappa coefficient of at least 0.40.

Two reviewers coded the remaining transcripts. The main coder randomly assigned transcripts to coders in batches of five. After coders completed their five assignments, the group reconvened and discussed coding uncertainties as a full coding team. Researchers then updated the codebook after reaching a consensus if needed. NVivo version 13 (QSR International) was used to organize and analyze coded interviews.

MI.1.7.7 ONE Startup and Ongoing Cost Analysis

Cost analysis was conducted to understand the (1) startup cost, (2) ongoing service delivery cost, and (3) ongoing cost per enrollment and appointment. Due to understaffing, one site transferred all its clients to a different provider and was therefore excluded from the ongoing service delivery cost analysis. All costs were adjusted to 2023 dollars using the Consumer Price Index. All analyses were completed in Microsoft Excel (version #2308) and Stata 18.

The COVID-19 pandemic impacted the timeline and roll-out of the telehealth platform. WIC service delivery in both intervention and comparison agencies was adjusted due to the pandemic and even the comparison agencies transitioned to remote service delivery during the pandemic's height. To facilitate the comparison of costs from before to after introduction of the telehealth solution and between intervention and comparison agencies, the pre-implementation period was set to FY2019, before the start of the pandemic (Michigan provided the FY2019 data to THIS-WIC in 2023). The cost analysis assessed how service delivery costs changed from pre-intervention (in FY2019) to post-intervention (January 2022 through June 2023).

ONE Startup Cost

Statewide startup costs for telehealth solution startup were calculated as follows:

1. Generating subtotals by summing the data for each resource category in the tool (e.g., labor, equipment, indirect, contracted services).
2. Computing total cost and cost per month as follows:

   Total cost = Sum of cost across resource categories

   Cost per month = total cost/number of months in the startup period

Ongoing WIC Service Delivery Cost

Ongoing service delivery costs were computed for each participating local agency at three time points: Baseline/pre-implementation (FY2019); at 6 months post-implementation (July 2022) and at 12 months post-implementation (January 2023), as follows:

1. Staffing cost was calculated by multiplying the reported average number of full-time equivalents (FTEs) each staff type spent providing nutrition and breastfeeding education services by that staff type's average hourly salary.
2. If an agency purchased equipment, the cost of the equipment was amortized over the reported period, until replacement.
3. Subtotals were created for each resource category (labor, equipment, supplies, contracted services, and indirect) and then summed across categories to calculate a total by site.

Ongoing Implementation Cost Per Enrollment and Per Appointment

To facilitate the comparison of costs from before to after introduction of the telehealth solution and between intervention and comparison agencies, the pre-implementation period was set to FY2019 (i.e., before the start of the pandemic). Changes in service delivery costs from pre-intervention (FY2019) post-intervention (February 2022 to January 2023) were examined.

Average monthly ongoing costs, average cost per enrollment, and average cost per appointment were computed for each period of the ongoing cost analysis. Ongoing costs per enrollment and per appointment were computed by dividing the average monthly cost by the number of monthly enrollments and monthly appointments in that same period. To understand the distribution of monthly costs, mean, median, minimum, and maximum cost per enrollment and per appointment were examined across the intervention and comparison agencies. Changes in ongoing service delivery per-enrollment and per-appointment costs from the pre-implementation to the post-implementation periods were compared for intervention and comparison agencies.

Return on Investment (ROI) Analysis

State agencies incur an initial startup cost to develop and implement the telehealth solution and this investment may provide a return based on the difference between the cost of conducting appointments with the telehealth solution and the cost of their standard approach. If it costs less to deliver services with the telehealth solution than usual care, the telehealth solution results in a financial return to the WIC agency. Once these savings surpass the startup costs, there is a positive return on the investment in the program. These returns can be used to provide services to additional clients.

To conduct the ROI analysis, the number of appointments that would be needed to recoup the startup costs was calculated by dividing total startup costs by the potential savings associated with each appointment conducted at agencies implementing the telehealth solution. The break-even point (i.e., the point at which the financial return equals the startup cost) was estimated by dividing the number of appointments needed to recoup the cost by the number of appointments conducted at agencies implementing the telehealth solution.

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