South Carolina Department of Health (DPH) WIC: Evaluation of Telehealth Solutions for South Carolina WIC

Final Report

Authors:
Erin Hennessy, PhD, MPH
Alice Ammerman, DrPH
Lauren Au, PhD, RD
Alan Barnosky, MA
Jonathan Blitstein, PhD
Sheryl Cates, BA
Kenneth Kwan Ho Chui, PhD
Josephine Cialone, MS, RDN
Sujata Dixit-Joshi, PhD
Lisa Gualtieri, PhD
Jeniffer Iriondo-Perez, MS
Olga Khavjou, MA
Elizabeth Krupinski, PhD
Danielle Louder, BS
Jerold Mande, MPH
Parke Wilde, PhD
Susan Woods, MD, MPH
Catherine Wright, MS
Qi (Harry) Zhang, PhD

Submitted by:
Friedman School of Nutrition Science and Policy
Tufts University
150 Harrison Ave
Boston, MA 02111

Project Director:
Erin Hennessy, PhD, MPH

Submitted To:
Karen Castellanos-Brown, PhD, Project Officer
and Pascasie Adedze, PhD, SNAS Liaison
USDA, Food and Nutrition Service
Braddock Metro Center II
1320 Braddock Place, Fifth Floor
Alexandria, VA 22314

This study was conducted under Grant Number OPS-WIC Telehealth-FY19-Tufts-MA with the U.S. Department of Agriculture, Food and Nutrition Service.

Suggested Citation: Hennessy, Erin, et al., *South Carolina Department of Health (DPH) WIC: Evaluation of Telehealth Solutions for South Carolina WIC, Final Report*. Prepared by Friedman School of Nutrition Science and Policy, Tufts University for the U.S. Department of Agriculture, Food and Nutrition Service, September 2024. Project Officer: Karen Castellanos-Brown.

Available online at https://thiswic.nutrition.tufts.edu/

September 2024

Tufts University | Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy

WIC Women, Infants & Children SOUTH CAROLINA

USDA Food and Nutrition Service U.S. DEPARTMENT OF AGRICULTURE

Acknowledgments

This project has been funded at least in part with Federal funds from the U.S. Department of Agriculture (USDA). The contents of this publication do not necessarily reflect the view or policies of USDA, and mention of trade names, commercial products, or organizations does not imply endorsement by the U.S. Government.

The Telehealth Intervention Strategies for Supplemental Nutrition Program for Women, Infants, and Children (THIS-WIC) team would like to thank the State and local agency staff who participated in this project and the WIC clients who participated in its evaluation. We would like to thank the THIS-WIC Leadership Team and Advisory Board who have provided support, guidance, and feedback throughout the project. We also would like to thank all the doctoral students and graduate and undergraduate research assistants whose efforts made this work possible.

Finally, we would like to thank our collaborators at USDA/Food and Nutrition Service (FNS), including the project officer Karen Castellanos-Brown, PhD, MSW, and the USDA/FNS WIC liaison Pascasie Adedze, PhD.

South Carolina WIC Project Team

Beverly Brockington, MS, RD, LD, CLC

Portavia Chandler, MSPH, APM

Jennifer Craig, MPH, RD, LD

Sylvia Davis, RD, LD, CLC

Jenna Deaver, RDN, LD, IBCLC

Heather Price, MBA, CGFO, CPM

Bettina Walker, MBA, CSM, PMP

Contents

Executive Summary **ES-1**

Background ES-1

Project Overview ES-1

Findings ES-2

Implementation of TeleWIC in SC ES-2

Cost of Implementing TeleWIC in SC ES-3

Client Experience with TeleWIC in SC ES-3

Recommendations ES-3

1. Background **1-1**

1.1 Need for Telehealth Solution in SC 1-2

1.2 Telehealth Technology Implementation Through THIS-WIC in SC 1-2

2. Project Methods **2-1**

2.1 Research Questions 2-1

2.2 WIC Agencies Participating in Telehealth Solution Implementation and Evaluation 2-2

2.3 Data Sources for TeleWIC Evaluation 2-2

2.3.1 MIS Data 2-2

2.3.2 Telehealth Metadata 2-3

2.3.3 Client and Staff Surveys 2-3

2.3.4 Staff Key Informant Interviews 2-3

2.3.5 Implementation Data 2-4

2.3.6 Telehealth Solution Startup and Ongoing Implementation Cost Data 2-4

2.4 Data Collection for THIS-WIC Evaluation 2-4

2.4.1 MIS Data 2-4

2.4.2 Telehealth Solution Metadata 2-5

2.4.3 Client and Staff Surveys 2-5

2.4.4 Staff Key Informant Interviews 2-5

2.4.5 Telehealth Solution Implementation Data 2-5

2.4.6 Telehealth Solution Startup and Ongoing Implementation Cost Data 2-5

2.5 Sample Description for THIS-WIC Evaluation 2-6

2.5.1 Client Survey Sample Size, Response Rate, Characteristics, and Representativeness 2-6
2.5.2 THIS-WIC Staff Survey Sample Size, Response Rate, and Representativeness 2-7
2.5.3 Staff Key Informant Interview Sample Size and Response Rate 2-7
2.6 Analytic Approach 2-7
2.6.1 Telehealth Solution Metadata 2-7
2.6.2 Client Survey 2-7
2.6.3 Staff Survey 2-8
2.6.4 Staff Key Informant Interviews 2-8
2.6.5 Telehealth Solution Implementation 2-9
2.6.6 Telehealth Solution Startup and Ongoing Costs 2-9

3. Results: TeleWIC Implementation in South Carolina 3-1

3.1 Telehealth Appointments Offered and Completed by Staff 3-1
3.2 Attitudes Toward Telehealth 3-1
3.3 Readiness to Implement Telehealth Solution 3-3
3.3.1 Telehealth Implementation Strategies 3-3
3.3.2 Staff Training and Frequency of Telehealth Use, and Mode Preference 3-3
3.4 Satisfaction with Telehealth Solution 3-6
3.5 Adoption of Telehealth Services 3-8
3.6 Acceptability of TeleWIC 3-9
3.7 Feasibility of Using TeleWIC 3-10
3.8 Improved Accessibility of WIC Services for Clients 3-12
3.9 Frequency of Travel and Travel Time 3-14
3.10 Startup Cost to Implement Telehealth Solution 3-14
3.11 Ongoing Cost to Implement TeleWIC 3-15
3.12 Summary of Findings: TeleWIC Implementation 3-16

4. Results: Client Experiences with Telehealth Services and TeleWIC 4-1

4.1 Acceptability of Telehealth Services 4-1
4.2 Barriers to Accessing WIC Services 4-2
4.2.1 Availability of Technology at Home 4-2
4.2.2 Comfort with Technology and Frequency of Videochat Use 4-4

4.2.3 Administrative, Individual, and Staff-Level Barriers to Accessing WIC Services 4-4
4.3 Satisfaction with WIC Services 4-5
4.4 Intent to Change Dietary Behaviors 4-6
4.5 Daily Fruit and Vegetable Intake 4-6
4.6 Summary of Findings: WIC Clients 4-7

5. Conclusions and Lessons Learned **5-1**

5.1 Implementation of Telehealth Services in SC 5-1
5.2 Client Experience and Outcomes 5-2
5.3 Lessons Learned 5-2
5.4 Implications 5-3
5.5 Strengths and Limitations 5-4
5.6 Sustainability 5-4

References **1**

Appendices

SC.1. Technical Appendix
SC.2. Secondary Data Sources and Variables
SC.3. Primary Data Collection Tools
SC.4. Supplemental Tables

Tables

Number **Page**

ES-1. Staff Preference for Using TeleWIC to Provide WIC Services in SC ES-2
ES-2. Client Preference to Receive WIC Services via Telehealth for Future Appointments in SC ES-3
2-1. Staff-, Agency-, and Client-Level Research Questions in SC 2-2
3-1. Services Offered to WIC Participants via Telehealth in SC 3-1
3-2. Attitudes Toward Telehealth among Staff Survey Respondents in SC 3-3
3-3. Telehealth Training Duration and Frequency of Use in Early and Late Phases in SC 3-4
3-4. Satisfaction with Telehealth in Early and Late Phases among Staff Survey Respondents in SC 3-6
3-5. Total Number of Sessions Scheduled and Kept and Average Session Length in SC 3-8
3-6. Acceptability of TeleWIC in Early and Late Phases among Staff Survey Respondents in SC 3-9
3-7. Feasibility of Using TeleWIC in Early and Late Phases among Staff Survey Respondents in SC 3-11
3-8. Staff Perceptions of Improved Accessibility to WIC Services for Clients Because of Telehealth in Early and Late Phases in SC 3-12
3-9. Frequency of Travel and Travel Time to Other WIC Sites among Staff Survey Respondents in the Early and Late Phases of Telehealth Implementation in SC 3-14
3-10. TeleWIC Solution Startup Costs in SC 3-15
3-11. Per Enrollment Cost at Intervention and Comparison Agencies in SC 3-15
3-12. Per Appointment Cost at Intervention and Comparison Agencies in SC 3-16
4-1. Client Survey Respondents' Attitudes Toward Telehealth Services in SC 4-2
4-2. Availability and Use of Technology at Home among Client Survey Respondents Overall and by Intervention and Comparison Agencies in SC 4-3
4-3. Comfort with Technology and Frequency of Videochat Use among Client Survey Respondents in SC 4-4
4-4. Barriers to Accessing WIC Services among Client Survey Respondents in Intervention and Comparison Agencies in SC 4-5
4-5. Satisfaction with WIC Appointment among Client Survey Respondents in Intervention and Comparison Agencies in SC 4-6
4-6. Intent to Change Dietary Behaviors Following the WIC Nutrition Education Lesson among Client Survey Respondents in Intervention and Comparison Agencies in SC 4-6
4-7. Daily Fruit and Vegetable Intake among Client Survey Respondents, Overall and in Intervention and Comparison Agencies in SC 4-7

List of Acronyms

Abbreviation	Definition
CFIR	Consolidated Framework for Implementation Research
CI	Confidence Interval
CLC	Certified Lactation Consultant
EBT	Electronic Benefit Transfer
FNS	Food and Nutrition Service
FY	Fiscal Year
IBCLC	International Board-Certified Lactation Consultant
IRB	Institutional Review Board
MIS	Management Information System
PA	Priority Area
RD	Registered Dietitian
RE-AIM	Reach, Effectiveness, Adoption, Implementation and Maintenance
SC	South Carolina
SD	Standard Deviation
SE	Standard Error
THIS-WIC	USDA/Tufts Telehealth Intervention Strategies for WIC
USDA	United States Department of Agriculture
WIC	Supplemental Nutrition Program for Women, Infants, and Children

Terms and Definitions

Term	Definition
Clinics	WIC clinics are locations where WIC clients receive services.
Comparison	Clinics that did not receive the telehealth intervention but where WIC clients had appointments via "usual care" mode.
Early phase	First quarter of implementation.
Intervention	Clinics that implemented the telehealth intervention.
Late phase	Final quarter of implementation.
Local agency	WIC administrative entity that oversees clinics where WIC clients receive services.
TeleWIC	Mobile-optimized telehealth solution developed by GCOM for SC WIC.
Telehealth	As defined by the U.S. Department of Health and Human Services, telehealth is the use of electronic communication and telecommunications technology to support long-distance clinical healthcare, patient and professional health-related education, public health, and health administration.
Usual care	Standard mode of delivery for WIC appointment. For THIS-WIC, during the COVID-19 pandemic under Federal waivers, usual care in WIC clinics was either telephone-based or in-clinic appointments.
WIC client	All individuals who receive WIC services at the intervention and comparison clinics involved in the THIS-WIC evaluation and represent the entire agency-level caseload, not just those in the THIS-WIC evaluation. In working with the States engaged in this work, the THIS-WIC team recognizes that States differ in how they refer to individuals who receive WIC services. Some States prefer to use the term "WIC client," whereas others use "WIC participant." Because of this and potential confusion with the term "participation" in the context of an evaluation, we use the term "client." We acknowledge that FNS's preferred term is "WIC participant."
WIC Client Survey respondent	Individuals who consented to participate in the study and responded to the THIS-WIC Client Survey. These individuals represent a subsample of all individuals who received WIC services at participating sites (WIC clients).
WIC client telehealth user	Individuals who used the telehealth solution (as documented by telehealth metadata); these individuals may or may not be survey respondents.
WIC staff key informant interview respondent	Individuals who consented to participate in the study and took part in a WIC staff key informant interview. These individuals were staff who delivered nutrition education/breastfeeding support using telehealth at participating sites and agreed to take part in the interview.

Term	Definition
WIC Staff Survey respondent	Individuals who consented to participate in the study and responded to the THIS-WIC Staff Survey. These individuals were staff who delivered nutrition education/breastfeeding support using telehealth at participating sites and agreed to take part in the survey.

Executive Summary

Background

Telehealth has emerged as an integral approach to offering health services because it may offer enhanced access, convenience in scheduling and receiving services, and cost savings. However, factors such as comfort level with digital technology, Internet availability, privacy and security concerns, and accessibility may be barriers to telehealth integration within the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The Consolidated Appropriations Act of 2019 (Public Law 1166) authorized the allocation of $5,000,000 for competitive telehealth grants to (1) supplement the nutrition education and breastfeeding support offered to individuals in the WIC program, and (2) decrease barriers to access WIC services. The U.S. Department of Agriculture (USDA), Food and Nutrition Service (FNS) awarded a Cooperative Agreement to Tufts University and collaborators in Telehealth Intervention Strategies for WIC (THIS-WIC) to support the implementation and evaluation of telehealth services in WIC. THIS-WIC awarded grants and evaluated telehealth solutions across seven WIC State agencies: District of Columbia, Georgia, Michigan, North Carolina, **South Carolina (SC)**, Vermont, and Wisconsin. This report describes the implementation and evaluation of telehealth services using TeleWIC, a portal app, in **SC**.

Project Overview

SC WIC developed an online mobile-friendly portal application, TeleWIC, in collaboration with its vendor GCOM, to provide WIC clients* with WIC services including high-risk nutrition education and breastfeeding education. The THIS-WIC evaluation in SC assessed the implementation of telehealth services using TeleWIC and compared staff-, agency-, and client-level outcomes for intervention (telehealth service delivery) versus comparison (phone-based service delivery or in-person) agencies. Between March 2023 (Q1/2022) and September 2023 (Q3/2023), seven agencies offered telehealth services and served as intervention agencies; seven agencies offered usual care and served as comparison agencies. Implementation evaluation findings are based on data collected from the SC Management Information System (MIS), State-level Implementation Tracking Tool, metadata from TeleWIC, THIS-WIC Staff Surveys, cost tracking data, and staff key informant interviews. Outcome evaluation findings are based on data collected from MIS and THIS-WIC Client Surveys.

* WIC clients are all individuals who receive WIC services at local agencies involved in the THIS-WIC evaluation and represent the entire agency level caseload, not just those who consented to be part of the evaluation. In working with the States engaged in this work, the THIS-WIC team recognizes that States vary in their terminology; some States use “WIC client” while others use “WIC participant.” For consistency and to avoid confusion with the term “participation” in the context of the THIS-WIC evaluation, the term “client.” We acknowledge that FNS’s preferred term is “WIC participant.”

Findings

Implementation of TeleWIC in SC

The number of appointments made and completed through TeleWIC peaked in the second quarter of implementation and dipped in the third quarter. About 60 percent of appointments scheduled via TeleWIC were kept; all appointments were scheduled for 45 minutes, but the average duration ranged from 16 to 22 minutes. For the 54 completed appointments, 18.5 percent lasted 30 minutes or more. Shorter appointments may reflect initiating the appointment via TeleWIC but switching over to phone and dropped or disconnected calls.

Data on TeleWIC use were provided by six respondents to the Staff Survey in the early phase and two in the late phase, so these findings should be interpreted with caution. SC WIC staff generally perceived that offering telehealth services provides an alternative to clients who face transportation, time, or other barriers to attending in-person appointments. All staff received training before scheduling TeleWIC appointments; however, staff noted that the training was compressed and didactic, leaving them unprepared to schedule TeleWIC appointments. Staff satisfaction with offering WIC services through the telehealth platform was consistently low in the early and late phases. Some staff expressed a preference for in-person appointments because of a lack of comfort with the platform, increase in appointment duration, and client preferences. Staff acknowledged variability in TeleWIC appointments with higher use at clinics with fewer staff. Staff expressed preferences for rolling out TeleWIC for scheduled appointments and extending it to on-demand appointments at a later time, when they were more comfortable with the platform. Overall, staff did not perceive TeleWIC to be a feasible approach to delivering WIC services (**Table ES-1**).

Table ES-1. Staff Preference for Using TeleWIC to Provide WIC Services in SC

	Early[b]	Late[b]	
	N = 6	N = 2	
Statement[a]	Mean (SD)		p-value[c]
Learning to use TeleWIC was easy for me.	3.67 (1.21)	3.50 (0.71)	0.864
I find TeleWIC to be easy to use.	4.17 (0.98)	2.00 (1.41)	0.047*
I find TeleWIC to be flexible to interact with.	3.67 (0.82)	2.00 (1.41)	0.074
I feel comfortable communicating with WIC clients using TeleWIC.	4.17 (0.75)	2.50 (2.12)	0.114
TeleWIC makes my daily work easier to do.	3.83 (0.98)	2.00 (1.41)	0.080
TeleWIC allows me to interact with more participants.	3.17 (0.41)	3.00 (0.00)	0.604

Note: SD = standard deviation

[a] Responses were assessed on a 5-point Likert scale, where 1 = Strongly disagree and 5 = Strongly agree.

[b] Ordinal data are summarized as predicted mean (SD).

[c] p-values were based on regression for ordinal data.

Cost of Implementing TeleWIC in SC

The startup cost to offer telehealth services in SC was $363,317, of which about 93 percent was spent on contracted services and 7 percent was spent on labor. The ongoing mean cost per enrollment declined from pre-intervention to the eighth month of the intervention by $3 at intervention agencies and $5 at comparison agencies.

Client Experience with TeleWIC in SC

Client survey respondents from intervention and comparison agencies had a high level of satisfaction with their WIC appointments; those from intervention agencies expressed a preference to continue receiving services the same way in the future (**Table ES-2**). Client experience with WIC appointments, intent to change dietary behaviors, and fruit and vegetable intake were similar among respondents in the intervention and comparison agencies.

Table ES-2. Client Preference to Receive WIC Services via Telehealth for Future Appointments in SC

Statement	N	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
		%				
The way I received WIC services at my most recent appointment was easier than going to a WIC clinic.	24	0.0	4.2	0.0	29.2	66.7
I would like to receive services the same way at my next WIC appointment.	24	0.0	0.0	4.2	29.2	66.7

Source: THIS-WIC Client Survey, intervention agencies only

Recommendations

WIC staff provided the following recommendations:

- Start TeleWIC rollout with scheduled appointments and introduce the on-demand appointments at a later date. This staggered approach will provide staff with time to become comfortable with the platform.
- Provide interactive, hands-on training with opportunities to learn the system instead of a didactive presentation.
- Integrate interpreters with telehealth service delivery to expand reach to the growing population of Hispanic and Portuguese clients.
- To increase client uptake, simplify client log-in and explore ways to facilitate sign-in to the app without having to create a username and password, such as through social media accounts.

1. Background

Telehealth technology allows healthcare providers to communicate with patients remotely, through a two-way, synchronous channel. It has emerged as an integral approach to offering healthcare services and could become a standard of care soon. For the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), telehealth may facilitate access to services in rural areas or in areas with staffing shortages, improve efficiency without increasing net costs, and reduce travel and wait time, making it convenient to schedule and receive timely care services. However, factors such as comfort level with digital technology, Internet availability, privacy and security concerns, and accessibility dictate the quality of client experience and may be barriers to telehealth integration within WIC. Understanding variations in telehealth use and adoption by staff and clients is necessary to inform telehealth use policies.

The Consolidated Appropriations Act of 2019 (Public Law 1166) authorized the allocation of $5,000,000 for competitive telehealth grants to (1) supplement the nutrition education and breastfeeding support offered to individuals in the WIC program, and (2) decrease barriers to accessing WIC services.[1] The U.S. Department of Agriculture (USDA), Food and Nutrition Service (FNS) awarded a Cooperative Agreement to Tufts University and collaborators in Telehealth Intervention Strategies for WIC (THIS-WIC) to support the implementation and evaluation of telehealth services in WIC. Through a competitive Request for Application process, State agencies submitted proposals to implement projects focused on one of two Priority Areas (PA):

- PA I: Implement an existing telehealth solution to ensure timely access to nutritional or breastfeeding support for WIC clients by qualified professionals.
- PA II: Develop and implement an online (mobile-friendly) resource or tool to provide nutritional or breastfeeding support to WIC clients that is within the scope of the nutrition education and/or breastfeeding support offered in the WIC clinic by qualified professionals, including Registered Dietitians (RDs), Certified Lactation Consultants (CLCs), and International Board-Certified Lactation Consultants (IBCLCs).

THIS-WIC awarded grants and evaluated telehealth solutions across seven WIC State agencies:

- PA I: District of Columbia, Georgia, Michigan, Wisconsin
- PA II: North Carolina, South Carolina (SC), Vermont

In addition, THIS-WIC provided technical assistance to all agencies throughout the study to support the adoption of telehealth and the evaluation of their telehealth interventions. THIS-WIC elevated the relevance of telehealth solutions due to the COVID-19 pandemic, which sharply increased public and agency attention on remote access to services. The project was funded and designed before the pandemic, and some aspects of the design were modified to account for USDA COVID-19 waivers. Specifically, prior to COVID-19, THIS-WIC evaluated the impact of delivery of WIC nutrition education and breastfeeding support services via telehealth

compared to usual care (i.e., in-person appointments). During COVID-19, with physical presence waivers in place, the majority of appointments in intervention agencies and all appointments in comparison agencies were remote and telephone-based. This report focuses on the implementation and outcomes of telehealth service delivery in SC using TeleWIC, a mobile-friendly portal app.

1.1 Need for Telehealth Solution in SC

In Fiscal Year (FY) 2019, SC WIC served slightly more than 84,500 participants[2]; participation declined the next year, and SC WIC served about 83,000 participants in FY2020, representing a 37.7 percent coverage rate.[3] About one-third of SC residents live in rural counties, and factors such as transportation costs, long wait times, and time away from work adversely affect WIC enrollment, retention rates, and show rate. From a staffing perspective, recruitment and retention of qualified professionals, including RDs and certified breastfeeding counselors, have also been challenging. In some areas of the State, as few as four RDs and one IBCLC cover 13 counties. Some of these staff members spend as much as 4 hours commuting on a given day, resulting in high staff transportation costs.

To address WIC clients' desire to reduce wait times, increase appointment flexibility, reduce staff transportation costs, and improve client and staff satisfaction rates, SC WIC partnered with a third-party vendor, GCOM Software (https://www.voyatek.com/voyatek-company-leadership/), to develop an application portal, TeleWIC. TeleWIC was designed to enhance access to WIC services, including high-risk nutrition care planning, breastfeeding education, breastfeeding support, and client high-risk assessment. TeleWIC allowed staff members to provide services from a designated clinic instead of having to commute to several satellite clinics in a week.

1.2 Telehealth Technology Implementation Through THIS-WIC in SC

SC WIC leveraged its existing partnership with GCOM, SC's Management Information System (MIS) provider, to develop a telehealth solution that incorporates TeleWIC into WIC programming. Development, testing, and validation of TeleWIC took place from February 2022 through February 2023. SC and GCOM worked through three rounds of alpha and beta testing, allowing SC to learn about how TeleWIC works and how it interfaces with MIS. SC State and local agency staff provided feedback to GCOM and completed after-action reviews. Feedback from the testing was incorporated into the final product. This iterative process ensured development of a system that was easy for WIC staff and clients to use.

TeleWIC is a mobile-optimized solution that WIC clients can use on a phone, tablet, or computer. Features include one-on-one video chat, audio chat, text chat, text messaging, and document sharing. Based on feedback from potential users, SC worked with GCOM to streamline log-in procedures for TeleWIC. For WIC staff, TeleWIC was integrated with SC's identity provider to allow staff to use the same log-in credentials as they use for all other SC systems. On the participant side, WIC clients can either use social media logins (e.g., Google, Facebook) to access TeleWIC or create an account. Identity verification of WIC clients is completed automatically using State-defined data, which MIS shares on the backend with

TeleWIC. Once logged in to TeleWIC, WIC clients can view upcoming appointments, access on-demand services during operating hours (i.e., scheduling on-demand breastfeeding support with available staff), access WIC staff-assigned documents (e.g., WIC brochures, handouts, nutrition education materials), and contact their local WIC clinic by text or email.

TeleWIC was integrated with SC's MIS, allowing appointments to be scheduled and managed through MIS. This included MIS controlling the clinics allowed to schedule TeleWIC appointments and the services (i.e., appointment type) that could be conducted via TeleWIC. MIS also documented appointment methods (e.g., in-person, phone, videoconference).

During the THIS-WIC evaluation, which served as a pilot for wider State rollout, SC used TeleWIC for three types of appointments: scheduled high-risk nutrition education, scheduled breastfeeding education and support, and on-demand breastfeeding support. WIC clients who were at nutritional high risk or had a high-risk medical condition were connected with an RD. WIC clients who were breastfeeding and experiencing difficulties were able to connect through TeleWIC to a designated breastfeeding expert, including CLCs and IBCLCs.

For scheduled appointments, WIC staff members invite WIC clients to the meeting by email or text. After the client enters the virtual meeting room, the staff member can start the video. For on-demand appointments (e.g., when a client is experiencing a problem with breastfeeding), the client can initiate a meeting request through TeleWIC and see published meeting rooms (i.e., those with available WIC staff) along with queue count. Clients can filter by staff availability (online/offline) and choose a specific WIC staff member to connect with. Depending on staff availability, the portal will start a video call or place the client in a meeting room until the staff member initiates a video call. The TeleWIC clinic portal includes a dashboard for monitoring upcoming, waiting, and in-progress calls; allows multiple providers to join calls simultaneously; and gives staff members the ability to share documentation.

During the THIS-WIC evaluation, the promotion of telehealth appointments via TeleWIC occurred at the time of certification or recertification when a high-risk referral to an RD was identified. These referrals require clients to schedule an RD appointment within 30 days of their certification; these clients will be given the opportunity to complete that referral via TeleWIC. TeleWIC was promoted when clients were referred to IBCLCs or CLCs for additional education and support. The client decides whether to use TeleWIC or schedule in-person appointments to seek additional support and complete the referral.

2. Project Methods

SC used a group-randomized controlled design to examine whether the use of a portal-based, mobile-friendly telehealth solution decreased barriers and increased access to services in underserved communities, increased client satisfaction, and increased opportunities for delivery of nutrition education and breastfeeding support over a 7-month period, from March 2023 through September 2023. The evaluation focused on the use of TeleWIC to provide high-risk nutrition and breastfeeding support to clients. Clients who used the app could receive one to four interactions per year, based on their risk status and need for breastfeeding support. Most clients had only one interaction in a 12-month period.

Overall, THIS-WIC used the five-stage model for comprehensive research on telehealth developed by Fatehi and colleagues[4] to guide the overall design of the telehealth research study. SC's telehealth project was in the second and third stages (service design and pre-implementation); see **Appendix SC.1** for details and the model.

2.1 Research Questions

THIS-WIC examined several research questions to understand (1) the implementation and impact of TeleWIC when added to WIC standard operating procedures for nutrition education and breastfeeding support (**Table 2-1)** and (2) whether TeleWIC could reduce known barriers to WIC participation by enhancing existing care practices. In the wake of COVID-19, THIS-WIC worked closely with SC WIC to understand changes to usual practices during implementation (e.g., offering telephone-based appointments as "usual care"). An Implementation Tracking Tool was developed to document and understand delivery of services in intervention and comparison agencies throughout the evaluation period.

Table 2-1. Staff-, Agency-, and Client-Level Research Questions in SC

Staff and Agency Level	
▪ What was the staff attitude toward the telehealth solution? ▪ What was the staff level of readiness to implement the telehealth solution? ▪ What was the staff level of satisfaction with the telehealth solution? ▪ What was the staff level of telehealth solution adoption? ▪ What was the staff acceptability of the telehealth solution?	▪ What was the perceived feasibility of using the telehealth solution to provide WIC services? ▪ Did staff perceive telehealth services to make WIC services more accessible for WIC clients? ▪ Did offering telehealth services affect staff travel (frequency and time) to clinics? ▪ What was the startup cost of a telehealth solution in WIC? ▪ What was the ongoing cost of offering WIC services at the intervention and comparison agencies?
Client Level	
▪ What was the level of telehealth solution adoption among clients in the intervention agencies? ▪ What was the level of satisfaction with WIC services in the intervention and comparison agencies? ▪ What was the perceived acceptability (accessibility and feasibility) of WIC services in the intervention and comparison agencies?	▪ What were the perceived barriers to attending WIC appointments in the intervention and comparison agencies? ▪ What was the intent to change dietary behaviors in the intervention and comparison agencies? ▪ What was the daily fruit and vegetable intake in the intervention and comparison agencies?

2.2 WIC Agencies Participating in Telehealth Solution Implementation and Evaluation

SC identified WIC clinics with declining rates of WIC participation and randomly selected seven intervention and seven comparison agencies from two regions of the State. **Appendix SC.1** lists the local agencies involved in the THIS-WIC evaluation.

2.3 Data Sources for TeleWIC Evaluation

This study used new and existing quantitative and new qualitative data to assess processes and outcomes. The data sources were (1) MIS data, (2) telehealth metadata collected directly by TeleWIC, (3) THIS-WIC Client Survey data, (4) THIS-WIC Staff Survey data, (5) staff key informant interview data, (6) implementation data, and (7) cost data. **Appendix SC.1** lists the leads for developing and collecting these data.

2.3.1 MIS Data

SC MIS provided administrative data at the microlevel (individual-level MIS data from WIC clients who completed the Client Survey). See **Appendix SC.2** for the list of MIS data provided by SC WIC.

2.3.2 Telehealth Metadata

TeleWIC captured monthly aggregate data at the agency level on the number and type of telehealth appointments scheduled and kept, appointment duration, and number of documents shared. See **Appendix SC.2** for the list of telehealth metadata provided by SC WIC.

2.3.3 Client and Staff Surveys

2.3.3.1 Client Survey

The Client Survey was developed by THIS-WIC to assess accessibility, barriers, satisfaction, and attitudes toward using telehealth. The Client Survey was developed using existing valid/reliable tools[5-19]; SC WIC reviewed the survey to ensure that it captured key aspects of its telehealth solutions, that it had a low respondent burden and easy-to-follow format, and that the literacy level were appropriate for the WIC clients they served. The survey was tested with WIC clients (N = 11) in a local agency not participating in the THIS-WIC evaluation, and the average survey completion time was less than 5 minutes. The findings from the pilot testing were used to clarify wording and improve navigability. The final Client Survey included 37 questions, with an expected respondent burden of 10 minutes. The survey was translated into universal Spanish. See **Appendix SC.3** for the English- and Spanish-language versions of the Client Survey.

2.3.3.2 Staff Survey

THIS-WIC developed the Staff Survey to assess staff satisfaction with telehealth for providing nutrition education and breastfeeding support, accessibility and acceptability of the solution, and staff attitudes toward and readiness for telehealth use. The survey items are drawn from reliable and valid instruments[10, 17, 20-26] and focus on key outcomes listed in **Table 2-1**, along with additional demographic questions and covariates (e.g., years of experience working at WIC). As with the Client Survey, a research survey methodologist reviewed the Staff Survey to ensure comprehension and readability. The final English-language Staff Survey included 25 questions, and the average completion time was 15 minutes. See **Appendix SC.3** for the Staff Survey.

2.3.4 Staff Key Informant Interviews

WIC staff members and directors implementing TeleWIC were invited to participate in interviews. The key informant interview guides were developed by THIS-WIC in collaboration with the State agencies; the questions were informed by the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM)[27] implementation framework and the Consolidated Framework for Implementation Research (CFIR)[28] to assess eight key aspects, such as relative advantage, compatibility, complexity, and trialability. Once developed, the guide was tested and refined through a mock interview conducted with a THIS-WIC Advisory Board member who is a former WIC State agency director. Interview findings were used to understand the diffusion of telehealth solutions, activities undertaken to ensure successful implementation, and modifications to workflow to address challenges. Interviews were scheduled for 60 minutes. See **Appendix SC.3** for the discussion guide for the WIC staff and director interviews.

2.3.5 Implementation Data

Telehealth implementation data were obtained from a 46-item Implementation Tracking Tool completed by the SC WIC project team in the early, mid, and late phases of implementation.

2.3.5.1 Implementation Tracking Tool

To assess implementation adoption, the THIS-WIC project management team developed an Implementation Tracking Tool with a menu of 46 implementation strategies (e.g., identify and prepare champions) from the Expert Recommendations for Implementing Change study.[29] In collaboration with THIS-WIC, SC developed implementation tracking plans and tools for use at intervention agencies. THIS-WIC projects were expected to select strategies that aligned best with their overall goals, rather than implementing all 46 strategies. See **Appendix SC.3** for the Implementation Tracking Tool.

2.3.6 Telehealth Solution Startup and Ongoing Implementation Cost Data

THIS-WIC collected both startup and ongoing costs. Examples of startup costs included purchase of videoconference software license and platform access, purchase of new equipment, and staff training. Ongoing costs are those required to deliver nutrition education and breastfeeding services. For intervention agencies that implemented TeleWIC, ongoing costs for the period after the solution was implemented included annual costs related to maintenance of the telehealth solution (e.g., ongoing training and IT support, service platform subscription, supplies and materials, administrative time). See **Appendix SC.3** for the ongoing cost tracking tool.

2.4 Data Collection for THIS-WIC Evaluation

The SC Institutional Review Board (IRB) served as the IRB of record for the protocol related to collection of WIC client data (Client Survey, MIS data, telehealth metadata). The Tufts University IRB established a reliance agreement for the client protocol and separately reviewed and approved all protocols and data collection materials for the Staff Survey and key informant staff interviews led by THIS-WIC.

Before data collection, the THIS-WIC principal investigator and study personnel completed human subject protection training, in line with the requirements of the IRB overseeing the protocol. In addition, THIS-WIC designed and provided online training via Zoom to SC WIC study personnel relevant to their involvement in the project. The training covered both implementation and evaluation aspects of the work, including details on the study and an overview of human subjects' research protection. This training was recorded to be available for reference and for any new staff who came on board after the start of implementation.

2.4.1 MIS Data

At the study's onset, SC WIC provided microlevel data weekly, allowing the THIS-WIC study team to review the data and give SC WIC feedback on data quality and integrity questions. After

the processes were established, SC WIC provided these microlevel data monthly for the rest of the study.

2.4.2 Telehealth Solution Metadata

SC WIC shared the metadata from TeleWIC with THIS-WIC at the conclusion of the evaluation. All data were captured directly by the TeleWIC platform and provided in Excel format to the THIS-WIC team.

2.4.3 Client and Staff Surveys

2.4.3.1 Client Survey

The Client Survey was programmed through Microsoft Forms (Microsoft, Redmond, WA), and survey links with embedded consent were sent directly to eligible participants by GCOM MIS by text or email. Survey respondents received a $25 Amazon gift card for completing the survey.

2.4.3.2 Staff Survey

SC WIC provided a list of eligible staff (i.e., those who were responsible for delivering nutrition education/breastfeeding support at intervention agencies) (N = 17) and their email address to THIS-WIC. THIS-WIC sent an invitational email with a link to the Staff Survey to all eligible staff. The Staff Survey was distributed electronically via Qualtrics twice during the intervention: once in the first quarter after project implementation (early phase) and again in the last quarter of project implementation (late phase). Up to two reminders were sent via email to eligible staff who did not complete a survey, and reminders were sent at 1 week and 2 weeks after the initial outreach. Incentives were not provided to WIC staff for completing surveys, in compliance with Federal and/or State policies.

2.4.4 Staff Key Informant Interviews

The THIS-WIC team used a semistructured interview guide to conduct key informant interviews via Zoom in the early and late phases of the implementation period (first and last quarter of project implementation period). The interviews were scheduled for 1 hour and digitally recorded. Incentives were not provided to WIC staff for completing interviews, in compliance with Federal and/or State policies.

2.4.5 Telehealth Solution Implementation Data

Implementation data were collected from responses to the Implementation Tracking Tool for early (pre-implementation), mid, and late phases of implementation.

2.4.6 Telehealth Solution Startup and Ongoing Implementation Cost Data

For startup costs, THIS-WIC extracted data from the original project budgets the SC State agency provided at the time of award. This included information on all staff working on startup activities (both paid for from the grant and in-kind contributions), equipment used in startup activities (both paid for from the grant and in-kind contributions), and contracted services supporting startup activities. THIS-WIC conducted follow-up interviews with SC WIC staff to

obtain missing data. This information included program implementation and evaluation for staff members and other resources, in-kind staff and resources not listed in budgets, and details on the services specified in contracts.

For ongoing costs of delivering services, SC WIC completed an Excel-based cost collection tool reporting on the resources used to provide services in a month and the number of clients served. The tool captured all staff, infrastructure and equipment, supplies, contracted services, overhead, and travel used for providing services at intervention and comparison agencies. The resource data were combined with the reported number of monthly enrollments and appointments to generate the cost per enrollment and per appointment. THIS-WIC collected costs for a typical month before telehealth implementation for FY2019 (initial) and an average of the first 4 months (midpoint) and last 4 months (endpoint) of implementation. THIS-WIC reviewed completed cost instruments submitted by the SC WIC to ensure correct and reasonable data entries and conducted follow-up to resolve data issues.

2.5 Sample Description for THIS-WIC Evaluation

Primary data were collected via survey from WIC clients and staff. Key informant interviews were also conducted with WIC staff.

2.5.1 Client Survey Sample Size, Response Rate, Characteristics, and Representativeness

WIC clients who received nutrition education or breastfeeding support were eligible to take part in the evaluation. Respondents had to be 18 years of age or older and 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.

Following their WIC appointment, 1,537 WIC clients were invited to complete the Client Survey; 49 clients consented to the survey, yielding a 3.2 percent response rate. All those who consented completed the survey and were successfully linked with the MIS identifier; analysis that did not include demographic variables derived from the MIS included all completed surveys. Analysis involving MIS data to describe the characteristics of survey respondents and regression modeling controlling for demographic characteristics was limited to the data from matched respondents.

Of the 49 survey respondents, 28 (57.1%) were from intervention agencies and 21 (42.9%) were from comparison agencies. None of the household characteristics were significantly different between respondents in the intervention and comparison agencies. Overall, half of the respondents (50.0%) self-identified as non-Hispanic Black/African American, 35.4 percent identified as Non-Hispanic White, and slightly less than 10.4 percent identified as Hispanic. More than half of respondents (60.4%) were between 26 and 35 years of age, 54.5 percent had 1 to 5 years of college, and 39.4 percent had completed 9 to 12 years of high school. All respondents (with matching MIS data) reported using English at home (written). The median household size was three members, and the median annual household income was $16,800.

About half (53.2%) of respondents lived in a rural area, 23.4 percent lived in an urban area, and 23.4 percent lived in a suburban area.

About half of respondents (52.1%) had received WIC services for less than 1 year, and 18.8 percent had received WIC services for 5 years or more. More than one-third (38.8%) of respondents had a high-risk WIC client in their household. MIS data were used to classify clients as high risk at their most recent appointment. See **Appendix SC.1** for sociodemographic characteristics and representativeness of the Client Survey responses.

2.5.2 THIS-WIC Staff Survey Sample Size, Response Rate, and Representativeness

All staff involved in the delivery of nutrition education/breastfeeding support at intervention agencies were invited to participate in the Staff Survey. In the early phase, 17 staff members were invited to participate in the survey, and in the late phase, 16 were invited. The response rates for surveys in the early and late phases were 47.1 percent and 50 percent, respectively. Because WIC agencies experienced staff turnover and hired new staff, the same survey was administered in the early and late phases.

Respondents in the early and late phases were comparable in age, race/ethnicity, role at WIC, years of WIC experience, and travel to other WIC clinics. WIC staff were primarily RD and breastfeeding support staff, and about 40 percent had worked in WIC for more than 12 years. Although all staff surveyed in the early phase traveled to provide services before the COVID-19 pandemic, about 85 percent did so in the late phase. See **Appendix SC.1** for the characteristics of Staff Survey respondents at the early and late phases.

2.5.3 Staff Key Informant Interview Sample Size and Response Rate

All staff and local agency directors involved in implementing TeleWIC were invited to participate in the key informant interviews. The response rate for staff interviews was 27.8 percent in the early phase and 12.5 percent in the late phase.

2.6 Analytic Approach

2.6.1 Telehealth Solution Metadata

TeleWIC automatically documented usage metadata at the appointment level. SC WIC provided metadata for all TeleWIC appointments spanning the 7-month intervention period.

2.6.2 Client Survey

The client outcomes evaluation examined the experiences of WIC clients who received WIC services and completed the Client Survey in one of the WIC clinics associated with the 14 agencies in the study between March 2023 and September 2023. Client survey data were analyzed using descriptive statistics, crosstabulations, and unadjusted and multivariable regression.

Descriptive statistics include respondent and household demographics, availability of and comfort with technology, attitudes toward telehealth intervention, and respondent behaviors (fruit and vegetable consumption). Crosstabulations for categorical variables present proportions among those who provided data (i.e., missing values were excluded from the analysis) by group (intervention and comparison). Descriptive statistics for continuous variables present medians and interquartile ranges (25th percentile to 75th percentile) because the data on household income and household size were assumed to be skewed.

Significance tests compare demographics and household characteristics, availability of and comfort with technology, 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. This test examines whether the two samples come from the same population by assessing the distribution of sample scores around the median instead of comparing the actual median values. Analyses to assess client outcomes (satisfaction index, barriers, and behavior change intentions) employed unadjusted hierarchical linear regression models comparing differences in means for intervention and comparison agencies. For the client satisfaction index, demographic/household variables that demonstrated statistically significant differences between intervention and comparison agencies were entered into multivariable hierarchical linear regression. See **Appendix SC.1** for details.

2.6.3 Staff Survey

Descriptive analyses were undertaken to examine the Staff Survey data. Chi-square tests were performed to examine differences in responses from early to late phase surveys. When analyzing the staff outcomes, whenever feasible, attempts were made to adjust for biases in standard error estimates caused by repeated measurements. For ordinal/continuous outcomes, the analysis adjusted for the unique participant ID numbers as random effect and corrected for repeated measurements. However, because of low sample size, the same adjustments could not be made for categorical outcomes, which impose more stringent sample size requirements. Instead, these data were analyzed as if the two time points were not related. All analyses were conducted in Stata 18 (StataCorp LLC, College Station, TX, USA).

2.6.4 Staff Key Informant Interviews

All interviews were conducted in English, audio recorded, and transcribed by Zoom. Team members reviewed each transcript for accuracy by listening to the audio recording and corrected them to reflect actual dialogue spoken. Before undertaking analysis, three THIS-WIC team members created a preliminary codebook with codes deductively informed primarily by CFIR[28] and the Evaluation Framework for Telemedicine.[30] The five trained qualitative researchers who conducted the interviews also coded the interviews. Graduate research assistants (n = 5) with coursework and prior experience in qualitative analyses also coded interviews. A single codebook was used for both early- and late-phase coding. To start, coders independently coded the same four transcripts from the different WIC State agency projects. Coders met to compare codes, arrive at a final determination, and update the codebook if

necessary. Additional details of establishing interrater reliability are provided in the technical appendix (**Appendix SC.1**).

2.6.5 Telehealth Solution Implementation

The analysis of the Implementation Tracking Tool data involved tabulating the startup, mid, and late phase status for each menu strategy to assess change over time. The startup measures were considered the implementation plan, and the change from startup to mid and late phase measures were considered indicative of readiness. In addition to understanding the readiness for implementation, these data were also used to provide context for the staff- and client-level outcomes. See **Appendix SC.1** for details.

2.6.6 Telehealth Solution Startup and Ongoing Costs

Cost analysis was conducted to understand the startup cost, ongoing service delivery cost, and ongoing cost per enrollment and per appointment. All costs were adjusted to 2023 dollars using the Consumer Price Index. All analyses were completed in Microsoft Excel and Stata 18.0. The COVID-19 pandemic affected the timeline and rollout of the telehealth platform. WIC service delivery in intervention and comparison agencies was adjusted because of 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 and after the telehealth solution and between intervention and comparison agencies, the pre-implementation period was set to FY2019—in other words, before the pandemic (SC WIC provided the FY2019 data to THIS-WIC in 2023). Changes in service delivery costs from pre-intervention (FY 2019) to post-intervention (March 2023 through September 2023) were examined.

3. Results: TeleWIC Implementation in South Carolina

Between Q1/2023 and Q3/2023 (March 2023 through September 2023), 14 agencies (7 intervention and 7 comparison) participated in the 7-month telehealth evaluation. This chapter presents implementation outcomes (process and cost); Chapter 4 presents the client experience with telehealth and the primary and secondary outcomes.

3.1 Telehealth Appointments Offered and Completed by Staff

Information on telehealth appointments offered and completed by WIC staff using TeleWIC was assessed using data gathered from the Staff Survey and TeleWIC metadata. Staff survey respondents from intervention agencies conducted nutrition counseling and breastfeeding support using TeleWIC. Although most survey respondents in the early phase used TeleWIC to deliver nutrition counseling, breastfeeding support, or both, most respondents in the late phase did not use TeleWIC to provide counseling or support (**Table 3-1**). The SC WIC agency director noted that participants and providers preferred phone appointments because of their simplicity; staff members expressed unease with using multiple screens during appointments with clients.

Table 3-1. Services Offered to WIC Participants via Telehealth in SC

	Early Phase	Late Phase	
	N = 8	N = 8	
Services Offered	%		p-value[a]
Nutrition counseling	25.0	12.5	0.228
Breastfeeding support	37.5	12.5	
Nutrition counseling and breastfeeding support	12.5	0.0	
Neither	25.0	75.0	

Sources: THIS-WIC Staff Survey and TeleWIC metadata via SC WIC, intervention agencies only
[a] p-values are based on Chi-square tests.

3.2 Attitudes Toward Telehealth

WIC staff had a positive attitude toward offering telehealth services; they acknowledged that telehealth services increased accessibility to WIC services and increased client participation and retention (CFIR constructs*: *innovation advantage, outer setting, inner setting, and characteristics of individuals*) through remote appointments. Statements centered around giving clients the flexibility to attend appointments from a setting of their choice (e.g., home, pumping room, hospital), be assured of their privacy, and not have to travel; staff also noted improved

* As described in Chapter 2, qualitative data were analyzed deductively using the CFIR Framework and inductively. To align project findings with the broader implementation science literature, we note alignment with CFIR constructs when appropriate.

participation and retention rates and reduced no-show rates. Staff also noted that offering telehealth services enhanced personal connections and communication with clients, which is not feasible during phone appointments. Finally, staff noted that offering telehealth services has reduced their travel time and allowed them to attend to more clients. Staff hoped that they could continue doing so.

> *"I think more accessible. Even with, you know, people having connectivity issues. There's always gonna be some sort of barrier. But I think this helps knock down barriers to access." [Staff participant 8]*
>
> *"I think it allows them to be in the comfort of either their own home or whether they're in a car. So they can choose. The participant can choose their setting. That they feel is as public or as private as they want it to be. Cause I've had some where they've been in the hospital like in a pumping room, and … we've talked that way versus another participant maybe feels like that's too public, and they want to be in the privacy of their own home. So, it lets them choose their setting and then on my end. I'm usually in my office, so you know, doors locked, and privacy is not an issue." [Staff participant 8]*
>
> *"With clients, I think it gives them more of a flexibility to take control of their own appointments and make sure they keep it because they like doing stuff over the phone. … But definitely these folks can keep on their jobs and stuff. They just can talk to us for 10 minutes and then get back to work, so they don't have to miss out on anything. So, this is a good thing." [Staff participant 7]*
>
> *"I think it has been very successful. The people that have used it, both users and the … clinicians, have had very good experiences with it, so I feel like it that in and of itself having that buy-in will help increase. Yes, that participation." [Staff participant 8]*
>
> *"It's brought that personability back into WIC that we've kind of lacked over the past three-and-a-half years. You know, not seeing people over the phone." [Staff participant 8]*
>
> *"Telehealth has definitely saved me some driving time for sure … able to see people in-person." [Staff participant 8]*
>
> *"If we're going back to pre-COVID, all of our dietitians traveled. So, one day they may be in their headquarters, the next day they may be at a site that's 20 min. away. Another day they may be at a site that's an hour and a half away. So, if they can do things through telehealth, they wouldn't have to travel. That, you know, not only would save them time, but we would be able to see more participants because it would be less travel time. So, we would be able to see more people." [Staff participant 10]*

Mean scores for perceived usefulness of telehealth in promoting health equity and integrating telehealth in all WIC organization's health equity strategies ranged from 2.50 to 4.00 and were comparable for early and later phases (**Table 3-2**). These scores suggest that staff were neutral on whether telehealth is a useful strategy in promoting health equity among WIC participants.

Table 3-2. Attitudes Toward Telehealth among Staff Survey Respondents in SC

Statement[a]	Early N = 6 Mean (SD)	Late N = 2 Mean (SD)	p-value[b]
Telehealth is useful in promoting health equity among my WIC participants.	3.67 (1.21)	3.5 (0.71)	0.864
Telehealth should be a part of all WIC organizations' health equity strategies.	4.00 (0.89)	2.5 (2.12)	0.174

Source: THIS-WIC Staff Survey

Note: SD = standard deviation.

[a] Responses were assessed on a 5-point Likert scale, with 1 = strongly disagree and 5 = strongly agree.

[b] All p-values are based on regression for ordinal data.

3.3 Readiness to Implement Telehealth Solution

Data on perceived readiness to implement the telehealth solution were obtained from three sources: (1) Implementation Tracking Tool completed by staff in in the early, midpoint, and endpoint of telehealth implementation, (2) the Staff Survey in the early and late phases, and (3) key informant interviews with SC WIC administrators and staff in the early and late phases.

3.3.1 Telehealth Implementation Strategies

At startup, SC WIC identified 18 strategies planned for implementation and had already implemented six strategies at the time of startup. By endpoint, SC had implemented 29 of the 46 strategies. Implementation included both strategies in the "provide interactive assistance" category: centralized technical assistance and local technical assistance. In addition, SC had implemented all but one strategy in each of the following categories: "adapt and tailor to context," "train and educate stakeholders," and "support clinicians." By endpoint, SC had not implemented either strategy in the "engage consumers" category and did not plan to do so.

3.3.2 Staff Training and Frequency of Telehealth Use, and Mode Preference

WIC staff delivering telehealth services were trained before implementation (**Table 3-3**). Staff reports on training duration varied; in the early phase, two-thirds of the staff reported receiving 2 to 4 hours of training, and in the late phase, half reported receiving 2 to 4 hours of training. In general, the hours of training reported by staff may reflect their experience with using telehealth; some staff may be reporting duration for the initial training, and others may be reporting duration for refresher training.

In the early phase, staff used TeleWIC weekly or monthly, and in the late phase, the staff member who responded used it monthly for nutrition education. In the early phase, staff used TeleWIC for breastfeeding education weekly and monthly, but in the late phase, the one staff member who responded used it weekly. No respondents in either phase preferred TeleWIC over in-person and phone options.

Table 3-3. Telehealth Training Duration and Frequency of Use in Early and Late Phases in SC

Variables	Early Phase	Late Phase	p-value[a]
	%		
Hours of training	N = 6	N = 2	0.149
0 hours	0.0	0.0	
0 to < 2 hours	16.7	0.0	
2 to < 4 hours	66.7	0.0	
4 to < 6 hours	16.7	50.0	
6 to < 8 hours	0.0	0.0	
8 or more hours	0.0	50.0	
Frequency of telehealth solution use: nutrition	N = 3	N = 1	0.248
Daily	0.0	0.0	
Weekly	66.7	0.0	
Monthly	33.3	100.0	
Every other month	0.0	0.0	
Frequency of telehealth solution use: breastfeeding	N = 4	N = 1	0.576
Daily	0.0	0.0	
Weekly	75.0	100	
Monthly	25.0	0.0	
Every other month	0.0	0.0	
Mode preference: nutrition counseling	N = 3	N = 1	
In-person	33.3	100.0	0.248
TeleWIC	0.0	0.0	
Phone	66.7	0.0	
Mode preference: breastfeeding support	N = 3	N = 0	—[b]
In-person	0.0	0.0	
TeleWIC	0.0	0.0	
Phone	100.0	0.0	

Source: THIS-WIC Staff Survey

[a] p-values are based on Chi-square tests.

[b] p-values are not available because of lack of variability in responses,

Key informant interviews also provided insights into the training offered to staff. Several statements captured the strengths and limitations of the training (CFIR constructs: *inner setting and implementation process*). In the early phase, staff noted that all training was conducted via Zoom, and they were given a printout of the PowerPoint slide deck. Although staff thought that the training was interactive, they also found that it was overwhelming and hectic. Staff also mentioned a lack of time to attend training. Staff noted that they became more comfortable with

TeleWIC after they spent time practicing on their own and wished training was spread across several sessions and more hands-on. Some staff appreciated the once-a-month training day and did not schedule any client appointments.

> *"We had, we had all of the meetings through Zoom, and ... they printed out PowerPoint slides and all of that as well. So, we had hands-on material, too." [Staff participant 7]*
>
> *"I think it was very interactive. And I think that might have been the problem for me that it was like it was, okay. If you click this then this should happen, or this screen should say this—does it say this? And that's kind of what we were putting on the Excel sheet. And once we got down to the, 'this is what it actually looks like. Let's play around in it.' That's where it became real for me, and it made more sense for me, because the Excel spreadsheet, like I said ... just look[ed] like a bunch of words and marks on a computer" [Staff participant 8]*
>
> *"It was a big hectic and overwhelming, because just looking at this Excel spreadsheet. And it's like, what is all this mean? just a lot of calls. So, I've got training, but it it's kind of like one of those things you need to really, actively do it, and it was kind of hard to schedule that in between my day." [Staff participant 8]*
>
> *"I think if they could have had training, more hands-on training. because, you know, it's one thing to see how things work on a screen. But it's different when you're actually needing to do it hands-on. So, I think if there was training like we had where we sit and watch, and they tell us what we have to do" [Staff participant 10]*

In both the early and late phases, although WIC staff acknowledged the potential benefits of the telehealth solution, they also expressed concerns about its execution amid the complexity and diversity of settings and realities of their workplace. For example, staff members acknowledged that TeleWIC included a lot of useful information about breastfeeding that they were not aware of; they also noted that having the data on frequency of contact with high-risk mothers and the urgency to schedule these appointments served as an impetus to use TeleWIC. Staff mentioned that TeleWIC appointments took longer, client uptake was low, and participants often did not show up for their scheduled appointments or called a few hours later, disrupting workflow. Staff also noted that the multistep process to set up an account and log in deterred the participants.

> *"The only time thing that I see, it does take a little bit longer to conduct the appointments on our end." [Staff participant 7]*
>
> *"If we call them, and they don't answer, then they can call us back at any time. So with, you know the telehealth, if you know we're on the call waiting for them, and they don't join in. Sometimes they may call us an hour or 2 later." [Staff participant 10]*
>
> *"And just really that hard data. And then having those user stories were very helpful. And then our State plan has changed to where now we have to schedule CLC appointments or high-risk referrals within 24 to 48 [hours]. So now it's kind of like*

they don't have a choice. So I feel like that has been the biggest motivator. To push [telehealth solution] and to push our lactation agenda forward." [Staff participant 8]

3.4 Satisfaction with Telehealth Solution

Average values for staff satisfaction with TeleWIC ranged from 2.5 to 4.17, and preference to use it ranged from 1.50 to 3.50; scores declined from the early to late phase (**Table 3-4**). These values reflect that overall staff were not satisfied with TeleWIC; they also did not prefer it over in-person appointments.

Table 3-4. Satisfaction with Telehealth in Early and Late Phases among Staff Survey Respondents in SC

	Early[b]	Late[b]	
	N = 6	N = 2	
Statement[a]	Mean (SD)		p-value[c]
Overall, I am satisfied with TeleWIC.	4.17 (0.98)	2.5 (2.12)	0.153
I prefer WIC appointments with TeleWIC over WIC appointments that are in-person.	3.50 (1.22)	1.5 (0.71)	0.078

Source: THIS-WIC Staff Survey

Note: SD = standard deviation

[a] Responses were assessed on a 5-point Likert scale, where 1 = Strongly disagree and 5 = Strongly agree.

[b] Ordinal data are summarized as predicted mean (SD).

[c] p-values were based on regression for ordinal data.

During key informant interviews, staff shared factors that affected their level of satisfaction with offering telehealth services. For example, staff members appreciated local agency leadership's enthusiasm and willingness to try new things with a focus on expansion and accessibility, particularly for rural clients. Staff noted that their leadership was available to support implementation and problem solve as needed. Staff also stressed the importance of collaborating with colleagues to feel prepared, brainstorming solutions to issues that arose.

"She [local agency leader] continues to be very instrumental in any of my questions." [Staff participant 1]

"If there were any problems, you know, we would try to brainstorm to figure out an idea of ... how to make it work ... and then bringing those ideas back to Central Office if ... it was an issue that we couldn't resolve." [Staff participant 10]

"Oh, yeah, I think we broke out in groups. So, I mean, everybody was struggling together. So, we had, it was like 3 or 4 people in a group trying to do testing and everything. ... We did a lot of communication back and forth, and now we had the, like, regroup back around maybe 3 or 4 o'clock that afternoon just to see what was what. ...

It was very tedious and long, to be honest with you, but it was a lot of interaction. We tried to work it out and talk through it." [Staff participant 7]

"When we eventually as a group kind of did the testing together, and we were able to bounce ideas off of each other like, okay, especially at 1 point where it was just saying EBT number. So, working clinic versus someone who hasn't really had that experience in clinic or has been outside of clinic thinking, someone is going to think this is a food stamps card … thinking those types of things through so when a client sees this or a participant sees this, this is what they are going to think. So I think when we were able to do that in a group setting that was that's what really helped me get prepared." [Staff participant 8]

"The nutrition staff. They were the ones really that played the integral part in this, because they were the ones that had to explain what this process was going to be to the participant and get their buy-in to it." [Staff participant 10]

Staff said that rolling out the scheduled and on-demand options simultaneously was challenging, as they had to learn two different systems. They preferred to become familiar with using the platform for scheduled appointments before adding on-demand appointments. Staff also expressed a need to integrate interpreters with telehealth service delivery so they could serve the growing population of Hispanic and Portuguese clients.

"I would definitely roll out on-demand at the same time as scheduled because it's two different ball games as far as I can see. And so I really, in fact, I was the one that requested that we do scheduled first and then on-demand. … It was nice to [say] 'Okay I got this down pat. Now let's add in the other factor,' and so that that would be good advice." [Staff participant 1]

"We have access to an interpreter service, and so we either call them when they're in-person or remotely. What we've been doing is just calling the service, and then the service calls the participant. However, I had one yesterday, and I thought she could have … benefited greatly, cause she was having issues with latch, from [telehealth solution]. But you know, how do you get an interpreter to, you know, interpret properly what you're trying to say and things of that nature." [Staff participant 8]

Most staff noted that the solution was simple and user-friendly. Staff felt that the client interface to schedule WIC appointments was easier than scheduling doctor's appointments. Some staff perceived the telehealth portal to be tedious and burdensome for the clients, as it involved multiple steps to set up accounts and log in to the system. In the late phase, staff noted that they had sufficient resources to fully facilitate and implement telehealth services.

"So now, they require, you know, multiple steps in order, setting up the account and then logging in. … It's more work for the participant." [Staff participant 10]

"So, again, that ease, that it's so user-friendly. I feel like, because I think when people think [telehealth solution] or telehealth, they kinda get intimidated by the technology

> *aspect of it. But then, when they actually log in to [telehealth solution], they see that it's you know, nothing like trying to log in for your doctor's appointment, 'cause that can be a headache." [Staff participant 8]*

3.5 Adoption of Telehealth Services

Adoption of telehealth services at intervention agencies was also assessed using data gathered from TeleWIC metadata and key informant interviews. Most of the appointments (68.5%) were scheduled for high-risk nutrition education, and nearly 30 percent (29.6%) were for breastfeeding support; appointment type was not specified for one appointment (2.1%) (data not shown). As seen in **Table 3-5**, staff scheduled 87 TeleWIC appointments and completed 54 (62.1%) over the three quarters. The total number of TeleWIC sessions scheduled and completed peaked in Q2/2023. In any given quarter, between 56 and 67 percent of scheduled appointments were completed. All appointments were scheduled for 45 minutes, but the average duration ranged from 17 to 22 minutes, with slightly shorter appointments in the earlier quarters. Shorter appointments may be because a staff member started a TeleWIC appointment and switched over to phone or experienced technical challenges, such as dropped or disconnected calls. For the 54 completed appointments, 18.5 percent lasted 30 minutes or more.

Table 3-5. Total Number of Sessions Scheduled and Kept and Average Session Length in SC

Sessions	Q1/2023	Q2/2023	Q3/2023	Total
Scheduled (N)	18	53	16	87
Completed (N)	12	33	9	54
Completed: scheduled (%)	66.7	62.3	56.3	62.1
Average appointment duration (Min)[a]	17	20	22	20
Range of appointment duration (Min)[a]	4–39	<1–53	5–43	<1–53

Source: TeleWIC metadata via SC WIC

[a] Includes completed appointments only.

Key informant interviews provided additional context into staff adoption of telehealth services. In early-phase interviews, staff mentioned conducting appointments using Teams or Zoom during the pandemic; this made it easier to transition to the new system, which was integrated into the WIC platform. Some staff acknowledged anxiety and apprehension in using telehealth because it was newness and expressed uncertainty about how to navigate a new system. Staff spent additional time setting up the appointment and noted that they spent more time conducting telehealth appointments than in-person appointments. Staff also perceived client reservations about moving away from long-standing practices and adopting new technology and low client uptake, likely because telehealth did not fit some of the appointment settings (e.g., while their infant is at the hospital) or because the alternative (phone-based appointment) was easier.

"Due to COVID, we were using Teams or Zoom or FaceTime. So, this is nothing new to me. I was already using Zoom, Teams, and FaceTime. So, it's basically the same thing. It's only just through the WIC platform." [Staff participant 1]

"Like most people, when you get introduced to something new, you have a little bit of anxiety just because you don't know what to expect," [Staff participant 1]

"I think if we had brought this in like as COVID hit or prior to COVID, and this was the option... I think there would have been a better outcome, just because the participants wouldn't know any different." [Staff participant 10]

"I will say it takes a little more time to set up on the front end. Then, you know, just picking up and doing my phone call but making sure that they're in place, that I'm in place. 'Cause I don't just do the breastfeeding assessments. I kind of do other things, since I'm a breastfeeding coordinator. So, making sure that at that time I'm ready. And then that they're also prepared, if that makes sense." [Staff participant 8]

"The only time thing that I see, it does take a little bit longer to conduct the appointments on our end." [Staff participant 7]

"Haven't had good uptake [client appointments through solution], I guess, due to folks not wanting to use it. And then also the complications that they're having don't really require telehealth or don't really necessitate telehealth. A lot of it has been hospitalized infants. So, it's just more counseling, and that doesn't necessarily mean that I need to see them on video or observe anything." [Staff participant 8]

3.6 Acceptability of TeleWIC

The mean scores for the two acceptability indicators were comparable and ranged from 2.50 to 4.50 (**Table 3-6**). For both statements—"TeleWIC is an acceptable way to provide WIC services" and "TeleWIC is useful for me as WIC staff"—a nonsignificant, approximate 2-point decrease was observed from the early to the late phase based on survey data from two staff.

Table 3-6. Acceptability of TeleWIC in Early and Late Phases among Staff Survey Respondents in SC

	Early[b]	Late[b]	
	N = 6	N = 2	
Statement[a]	Mean (SD)		p-value[c]
TeleWIC is an acceptable way to provide WIC services.	4.50 (0.84)	2.50 (2.12)	0.078
TeleWIC is useful for me as WIC staff.	4.33 (0.82)	2.50 (2.12)	0.097

Source: THIS-WIC Staff Survey

Note: SD = standard deviation

[a] Responses were assessed on a 5-point Likert scale, where 1 = Strongly disagree and 5 = Strongly agree.

[b] Ordinal data are summarized as predicted mean (SD).

[c] p-values were based on regression for ordinal data.

Findings from the key informant interviews indicate that staff considered telehealth to be an important part of providing services and recognized the need to let clients decide whether phone or telehealth works best for them (C*FIR innovation advantage and characteristics of individuals*). Staff noted that having the telehealth option has served as a motivator to push the '"lactation agenda forward," as they are able to track the data and found it rewarding to see the clients (instead of having phone appointments). Staff liked the ease of scheduling and conducting telehealth appointments, as it allowed them to pick up on social cues and use these for effective communication. Staff also appreciated the ability to chat via the telehealth solution, as it allowed them to continue the conversation when they experienced technological glitches or alert the client if they accidentally muted themselves or needed additional support. Finally, staff noted the importance of reminder messages, as the clients had to plan for when and where the video call would take place.

> *"I think if we keep it as an option, and people know that is there, they'll use it, and I think it's something that we can benefit from. Number one, because of the caseload. I mean we're going to keep our clients if we have a way to reach them without them having to come in, because some of them don't have transportation to get here. So, this is awesome, you know. So yeah, that's good." [Staff participant 7]*
>
> *"I think it is rewarding because you're able to visually see that you've helped someone and kind of know. And you're able to pick up on those cues … and I think some of that has been lost over the phone, too. You know, if you see someone starting to do things like it looks like they don't understand. You can kind of pick up on that visually versus over the phone. I mean, there's not as many cues." [Staff participant 8]*
>
> *"I like the ease of it. And getting back to that person … being able to pick up on those social cues and just seeing that understanding or lack thereof on someone's face versus over the phone, like, you have to be very intentional versus over the phone. I've had people who were in the doctor's office talking to me. I've had people at work, so when you have to be in a in place to do this … I feel like it's more beneficial." [Staff participant 8]*

3.7 Feasibility of Using TeleWIC

In both early and late phases, staff found it moderately easy to learn how to use TeleWIC (mean scores were 3.67 and 3.50 in the early and late phase, respectively) (**Table 3-7**). However, lower levels of agreement were seen in the other five feasibility indicators. Particularly, a significant decrease in mean score between the early and late phases was observed for the statement, "I find TeleWIC to be easy to use." Other decreases were not statistically significant.

Table 3-7. Feasibility of Using TeleWIC in Early and Late Phases among Staff Survey Respondents in SC

Statement[a]	Early[b] N = 6 Mean (SD)	Late[b] N = 2 Mean (SD)	p-value[c]
Learning to use TeleWIC was easy for me.	3.67 (1.21)	3.50 (0.71)	0.864
I find TeleWIC to be easy to use.	4.17 (0.98)	2.00 (1.41)	0.047*
I find TeleWIC to be flexible to interact with.	3.67 (0.82)	2.00 (1.41)	0.074
I feel comfortable communicating with WIC clients using TeleWIC.	4.17 (0.75)	2.50 (2.12)	0.114
TeleWIC makes my daily work easier to do.	3.83 (0.98)	2.00 (1.41)	0.080
TeleWIC allows me to interact with more participants.	3.17 (0.41)	3.99 (0.00)	0.604

Source: THIS-WIC Staff Survey

Note: SD = standard deviation

[a] Responses were assessed on a 5-point Likert scale, where 1 = Strongly disagree and 5 = Strongly agree.

[b] Ordinal data are summarized as predicted mean (SD).

[c] p-values were based on regression for ordinal data.

* p<0.05

Staff perceived that the telehealth solution was secure, backed by encryptions and firewalls, offered more privacy than other appointment types, and alleviated client concerns about privacy. Staff also mentioned that some clients with poor Internet access or limited technology savvy may need additional support to use it. Staff highlighted variability in their own receptivity to the telehealth solution, noting that clinics with one nutritionist on staff are more likely to use telehealth than clinics with multiple nutritionists. Staff expressed the need to educate and encourage staff to offer telehealth services, particularly if the plan was to continue offering it as an option to the clients.

> *"Versus something like Microsoft Teams, it's … secure. And they know it's secure. And there's so many encryptions and barriers and firewall and all that jazz." [Staff participant 8]*
>
> *"As long as you know, there's a good Internet connection, and that they have that, good. The participant has a good Internet connection again with mine. It's hit or miss, but the times that I did, it was very reliable." [Staff participant 8]*
>
> *"I found that some of them (staff) have had the buy-in to really encourage the participants to, you know, accept [telehealth solution] as a form of their appointment where others haven't. And then, where the nutritionists are at a site where they're by themselves, because nobody else is going to make that appointment … they've had to have that buy-in. So, the sites that have a single nutritionist, seem to do a little bit better than the sites that are larger and have multiple nutritionists." [Staff participant 10]*

> *"I think if we move forward … we'd really have to educate the staff continually about encouraging them to offer this as a service to the participants. I think it's easy for them in their day-to-day to just set up an appointment for the dietitian and make it a telephone call, because that's what they're used to doing. … I think if it's something that we are going to move forward with long term … it would take a lot of work because you'd have to educate the staff, and the staff would be the ones that would be talking to the clients and getting them, you know, to participate." [Staff participant 10]*

3.8 Improved Accessibility of WIC Services for Clients

As seen in **Table 3-8**, scores for the three statements assessing staff perceptions of improved accessibility of WIC services for WIC clients ranged from 2.50 to 4.33 and were comparable for the early and late phase, except for the statement, "I would like to continue using TeleWIC to provide WIC services." These scores indicate that staff had a mildly positive perception that TeleWIC improved accessibility to WIC services. However, they were less enthusiastic about continuing to use TeleWIC.

From a user perspective, WIC staff spoke about the core principle of WIC as ensuring equal treatment and access to services for all clients, regardless of their location and circumstances, and telehealth's ability to facilitate this. Staff noted that telehealth can help address barriers to access, such as transportation, resource availability, and rurality. Staff perceived telehealth as an alternative to in-person appointments for clients who may need immediate care or support and are unable to schedule or come in for in-person appointments because of health reasons.

Table 3-8. Staff Perceptions of Improved Accessibility to WIC Services for Clients Because of Telehealth in Early and Late Phases in SC

	Early[b]	Late[b]	
	N = 6	N = 2	
Statement[a]	Mean (SD)		p-value[c]
With TeleWIC, I am able to provide services for WIC participants who have difficulty accessing a clinic because of traffic or distance.	4.33 (0.82)	4.00 (0.00)	0.604
With TeleWIC, I am able to provide services for WIC participants who would usually miss their appointments.	3.50 (1.05)	3.50 (0.71)	>0.999
I would like to continue using TeleWIC to provide WIC services.	4.33 (0.82)	2.50 (2.12)	0.097

Source: THIS-WIC Staff Survey

Note: SD = standard deviation

[a] Responses were assessed on a 5-point Likert scale, where 1 = Strongly disagree and 5 = Strongly agree.

[b] Ordinal data are summarized as predicted mean (SD).

[c] p-values were based on regression for ordinal data.

"I think that that's the definition of what we do in WIC. I mean, nobody gets treated differently than anybody else." [Staff participant 1]

"People had transportation issues. we might be 40 min or an hour away from someone. So being able to deliver those services remotely is really a great opportunity for them." [Staff participant 8]

"A positive effect because now we have another option to throw out there. If they don't feel comfortable coming in, or they … need help right away, then we can get those services to them without them being stressed about, you know, not being able to get the support that they need." [Staff participant 7]

"I don't know what that would look like at all. But I know one of the sites I service … about 10% of that population is Spanish speaking, and a lot of them do breastfeed. But you know, when they come in-person, it's one thing, but you know, sometimes there [are], of course, issues with transportation or getting off of work. So this would be the best thing for them. But how do I integrate that into [telehealth solution] again? I don't know what that would look like. Just sprinkle putting that out there in the in the atmosphere." [Staff participant 8]

Staff attributed improvements in participation and retention rates and the decrease in no-show rates to flexibility in appointment modes available to clients. To increase uptake, some staff recommended exploring ways clients could sign into the app without having to create a username and password, such as through social media accounts.

"With clients, I think it gives them more of a flexibility to take control of their own appointments and make sure they keep it because they like doing stuff over the phone. ... But definitely these folks can keep on their jobs and stuff. They just can talk to us for 10 minutes and then get back to work, so they don't have to miss out on anything. So, this is a good thing." [Staff participant 7]

"I think it will help increase reach and participation. Especially in those hard-to-reach places where there are issues with transportation as a barrier. So, I think it will increase our participation." [Staff participant 8]

"I think it has been very successful. The people that have used it, both users and the, I guess, clinicians, have had very good experiences with it, so I feel like it that in and of itself having that buy-in will help increase ... participation." [Staff participant 8]

"Then other ways to log in, maybe like through Facebook or like through social media, because I know I don't log into anything creating my own username and password. I usually am like, 'Oh, sign in with Google.' So, if there's anything like that, I think that would definitely increase the uptake of it...I think if there was some way that they could log in on the [State] WIC mobile app. I think that would help as well, because everyone has the app." [Staff participant 8]

3.9 Frequency of Travel and Travel Time

The Staff Survey asked respondents about their travel for work at WIC. Staff who had worked for 2 years or more were asked whether their job included traveling to one or multiple WIC clinics before the COVID-19 pandemic. In the early phase, 88 percent of respondents traveled to one or more WIC clinics to provide services before the COVID-19 pandemic; in the late phase, 63 percent did so (data not shown). As seen in **Table 3-9**, neither the frequency of travel nor the travel time to other clinics differed significantly from the early phase to the late phase of telehealth implementation.

Table 3-9. Frequency of Travel and Travel Time to Other WIC Sites among Staff Survey Respondents in the Early and Late Phases of Telehealth Implementation in SC

Question	Early	Late	p-value[a]
	%		
On average, how many minutes of your workday did you spend traveling to these other WIC clinic sites?	N = 6	N = 2	0.828
15 mins or less	16.7	0.0	
16–30 mins	16.7	0.0	
31–60 mins	33.3	50.0	
61 mins or more	33.3	50.0	
On average, how frequently did your job require you to travel to these other WIC clinic sites?	N = 6	N = 2	0.801
More than 1 per week	33.3	50.0	
1 per week	16.7	0.0	
More than 1 per month	50.0	50.0	
1 per month	0.0	0.0	

Source: THIS-WIC Staff Survey

[a] p-values were based on Chi-square tests for categorical data.

3.10 Startup Cost to Implement Telehealth Solution

The startup period for implementing the telehealth solution in SC was from March 2021 through September 2022. Over this 19-month period, SC spent $363,317 setting up the telehealth solution, which translated to an average monthly cost of $19,122 (**Table 3-10**). During the startup phase, the single largest expense was on contracted services, accounting for 93 percent of total spending, and covering the cost of implementing changes to the MIS to support the telehealth solution.

Table 3-10. TeleWIC Solution Startup Costs in SC

Resource Category	Cost	Percentage of Total
Labor	$23,641	7
Equipment	$0	0
Indirect	$3,256	1
Contracted services	$336,420	93
Total (19 months)	$363,317	100
Average per month (19 months)	$19,122	—

Source: Cost Tracking Data, SC WIC agency
Note: Total sums to more than 100 because of rounding.

3.11 Ongoing Cost to Implement TeleWIC

Table 3-11 shows average ongoing costs of service delivery per enrollment for intervention and comparison agencies and for the three timepoints of the telehealth solution implementation (pre-implementation and 4 and 8 months post-implementation). During the pre-implementation period, the average cost per enrollment was the same in the intervention and comparison agencies ($6). After implementation of the telehealth solution in the intervention agencies, the average cost per enrollment in those agencies decreased to $5 per enrollment at the 4th and 8th months post-implementation. Meanwhile, average per enrollment costs in the comparison agencies also decreased to $5 at the 8th month of the intervention. There were small differences between the mean and median estimates for intervention and comparison agencies at each time point, indicating no skewness in the data. The minimum and maximum values also show minimal variation in per enrollment costs across the sites.

Table 3-11. Per Enrollment Cost at Intervention and Comparison Agencies in SC

	Pre-Implementation (FY2019)		4th Month Post-Implementation (May 2023)		8th Month Post-Implementation (September 2023)	
Value	Comparison (N = 7)	Intervention (N = 6)	Comparison (N = 7)	Intervention (N = 6)	Comparison (N = 7)	Intervention (N = 6)
Mean	$6	$6	$6	$5	$5	$5
Median	$5	$5	$7	$4	$6	$4
Min	$5	$5	$4	$4	$4	$4
Max	$8	$8	$7	$7	$6	$6

Source: Cost Tracking Data, SC WIC Agency

After the introduction of the telehealth solution, per appointment costs in the intervention agencies decreased from $56 pre-implementation to $53 at 4 and 8 months after implementation (**Table 3-12**). The ongoing per appointment costs also decreased in the

comparison sites (from $66 pre-implementation to $61 at 8 months post-implementation). The reduction in per appointment costs was $2 higher than in intervention sites.

Table 3-12. Per Appointment Cost at Intervention and Comparison Agencies in SC

	Pre-Implementation (FY2019)		4th Month Post-Implementation (May 2023)		8th Month Post-Implementation (September 2023)	
Value	Comparison (N = 7)	Intervention (N = 6)	Comparison (N = 7)	Intervention (N = 6)	Comparison (N = 7)	Intervention (N = 6)
Mean	$66	$56	$67	$53	$61	$53
Median	$57	$47	$78	$55	$45	$49
Min	$45	$44	$17	$32	$37	$34
Max	$124	$86	$125	$71	$99	$96

Source: Cost Tracking Data, SC WIC Agency

3.12 Summary of Findings: TeleWIC Implementation

In SC, 14 agencies (7 intervention and 7 comparison) participated in the THIS-WIC evaluation. WIC staff at intervention agencies used TeleWIC to provide high-risk nutrition education and breastfeeding support education. Key findings include the following:

1. **Staff attitude:** WIC staff had a positive attitude toward the use of TeleWIC. They acknowledged telehealth's role in ensuring that clients with barriers to attending in-person appointments such as transportation, childcare, and work conflicts could continue participating in WIC. Staff noted that TeleWIC facilitated client retention and reduced no-shows. However, they were neutral on whether telehealth promotes health equity among WIC participants and regarding the integration of telehealth as part of WIC's health equity strategies.
2. **Staff readiness:** Staff varied in their report on the duration of training offered by SC WIC in the early phase; in the late phase, staff reported receiving 2 to 6 hours of training (Half indicated 2 to 4 hours of training, and the other half indicated 4 to 6 hours of training). Some staff did not feel prepared to provide telehealth services for various reasons, including compressed training, didactic training, and time demands to learn the system. Others noted that it was interactive, and they appreciated the printout of the training slides to become familiar with TeleWIC. In the early phase, staff used TeleWIC weekly or monthly and by the late phase, staff were using it monthly. None of the staff preferred TeleWIC to in-person or phone appointments in either phase. Staff said that conducting TeleWIC appointments extended appointment time and clients did not always show up on time. Clients also preferred phone calls over video appointments because of their location (such as hospitals). However, staff acknowledged that TeleWIC will help ensure that high-risk clients are given appointments in a timely manner.

3. **Staff satisfaction:** Overall, staff satisfaction with offering TeleWIC services was consistently low to moderate in the early and late phase. Staff appreciated the leadership's approach of a slow rollout and hands-on approach to addressing challenges as they arose. Staff indicated that the simultaneous rollout of scheduled and on-demand TeleWIC service options was challenging, as they had to learn two different systems. They preferred to begin with scheduled appointments before launching on-demand appointments. Staff also felt that interpreters needed to be integrated with TeleWIC service delivery to ensure that their Hispanic and Portuguese clients were receiving services. Most staff acknowledged that it was simple and easy to use the TeleWIC platform, but some found it to be tedious and burdensome, as clients had to take several steps to set up their account and log into the system.
4. **Staff adoption:** The number of appointments scheduled and kept via TeleWIC slightly decreased, from 66.7 percent in Q1/2023 to 56.3 percent in Q3/2023. On average, appointments lasted about 16 to 22 minutes, with a slight increase in appointment duration over time. Before implementing TeleWIC, staff indicated that they used Zoom or Teams to provide WIC services during the COVID-19 pandemic, which made it easy to transition into the new system. However, some staff noted that clients were reluctant to move away from long-standing practices and adopt new technology, which translated to low client uptake. For the 54 completed appointments, 18.5 percent lasted 30 minutes or more.
5. **Staff acceptability:** In the early phase, mean scores for the two acceptability indicators were high but in the late phase, mean scores were indicative of low to moderate acceptability. A few staff members indicated that having the TeleWIC option served as a motivator to push the lactation agenda forward, and they felt that the telehealth appointments helped facilitate more meaningful communication with the clients because they could see the clients by video, which was not feasible for phone-based appointments. Some staff also noted that the chat functionality allowed them to communicate with their clients in case of technical issues such as clients muting themselves or having other issues.
6. **Perceived feasibility:** Mean scores for all six feasibility indicators were higher in the early phase than in the late phase, but these differences were not significant. Overall, the mean scores were indicative of low feasibility of using TeleWIC. Staff also described variability in TeleWIC use across participating agencies, indicating that use was driven by the number of staff at the clinic; higher numbers of staff usually translated to lower use. Staff highlighted the need to get staff buy-in and encourage them to use it. They also indicated that sending reminders is critical to prevent and reduce no-shows.
7. **Improved accessibility of WIC services for WIC clients:** During interviews, staff noted that TeleWIC has helped knock down barriers to access such as transportation, resource availability, and rurality. They also considered TeleWIC as an alternative to in-person appointments in situations where clients need immediate care or support but are not able to schedule an in-person appointment. However, survey scores for improved accessibility measures suggest that staff did not think that TeleWIC improved accessibility to WIC services.

8. **Travel to other WIC clinics to provide services:** Before the COVID-19 pandemic, about 88 percent of staff participating in early-phase interviews indicated they traveled to other clinics. In the late phase, about 63 percent did so. Neither frequency of travel nor time spent traveling differed among respondents in the early and late phase interviews.
9. **Startup costs:** The startup cost to offer telehealth services was $363,317, of which about 93 percent was spent on contracted services and 7 percent was spent on labor.
10. **Ongoing costs:** The mean ongoing cost per enrollment decreased slightly (from $6 to $5) from pre-implementation to the 8th month after telehealth solution implementation in both intervention and comparison sites. The mean ongoing cost per appointment decreased from $56 pre-implementation to $53 in the 8th month of the intervention in the intervention sites. The ongoing cost per appointment also decreased, from $66 to $61.

4. Results: Client Experiences with Telehealth Services and TeleWIC

SC implemented a telehealth solution that enabled WIC staff to offer remote appointments via TeleWIC to clients at intervention agencies. Client Survey responses and MIS data spanning the intervention period, March 2023 through September 2023 (Q1/2023 through Q3/2023), were used to assess client use of telehealth services and examine outcomes.

4.1 Acceptability of Telehealth Services

WIC clients in the intervention agencies responded to a series of questions about their experience using telehealth at their most recent appointment. As seen in **Table 4-1**, all respondents agreed or strongly agreed that they could hear the WIC nutrition educator clearly. Almost all respondents agreed or strongly agreed that they could easily talk to the WIC nutrition educator and that it was easy to figure out how to use and receive WIC services through telehealth. Most respondents (about 96 percent) agreed or strongly agreed that the way they received WIC services was easier than going to a WIC clinic and they would like to receive services the same way at their next WIC appointment. About 30 percent of respondents agreed or strongly agreed with the statement, “My WIC appointment was shorter than usual when receiving care.” Thirteen percent strongly disagreed with this statement, and nearly 57 percent neither agreed nor disagreed with this statement.

Four of the questions were answered by respondents who completed their appointment via TeleWIC using a video/webcam or screen share from the WIC nutrition educator (answered by fewer than five respondents). These respondents agreed or strongly agreed that they could see the WIC nutrition educator clearly, the telehealth platform was simple to use, and the content was in a language they could read (results not shown in table). Two respondents strongly disagreed or disagreed that they had trouble accessing the telehealth platform, and one was neutral.

Table 4-1. Client Survey Respondents' Attitudes Toward Telehealth Services in SC

Statement	N	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
		%				
I could easily talk to the WIC nutrition educator during my appointment.	24	0.0	0.0	4.2	33.3	62.5
I could see the WIC nutrition educator clearly.[a]	2	0.0	0.0	0.0	0.0	100.0
I could hear the WIC nutrition educator clearly.	24	0.0	0.0	0.0	37.5	62.5
It was easy to figure out how to use and receive WIC services.	23	0.0	0.0	4.3	43.5	52.2
The telehealth platform was simple to use for my WIC appointment.[a]	2	0.0	0.0	0.0	50.0	50.0
I had trouble accessing the telehealth platform.[a]	3	33.3	33.3	33.3	0.0	0.0
My most recent WIC appointment was shorter than usual when receiving care.	23	13.0	0.0	56.5	17.4	13.0
The way I received WIC services at my most recent appointment was easier than going to a WIC clinic.	24	0.0	4.2	0.0	29.2	66.7
I would like to receive services the same way as my most recent appointment for my next WIC appointment.	24	0.0	0.0	4.2	29.2	66.7

Source: THIS-WIC Client Survey, intervention agencies only

NOTE: Includes 112 respondents who indicated their most recent appointment was on-site at the WIC clinic.

[a] Asked only if respondents completed their appointment via TeleWIC using a video/webcam or screen share from the WIC nutrition educator.

4.2 Barriers to Accessing WIC Services

4.2.1 Availability of Technology at Home

Most survey respondents had access to a smartphone or computer at home. As seen in **Table 4-2**, nearly 80 percent had a smartphone, and many had a computer or tablet at home. Respondents primarily connected to the Internet using their home connections (87.2%), followed by cellular connections (12.8%). Among those who connected to the Internet using their home connections, less than 15 percent encountered problems often, and less than 20 percent encountered problems sometimes. Among those not connecting at home, common reasons included Internet cost (37.5%) and privacy/security (25.0%).

Table 4-2. Availability and Use of Technology at Home among Client Survey Respondents Overall and by Intervention and Comparison Agencies in SC

Availability and Use of Technology	Overall	Intervention	Comparison	p-value[a]
		%		
Which of the following do you have at home?[b]	N = 49	N = 28	N = 21	
A desktop or laptop computer	61.2	57.1	66.7	0.4983
A tablet computer	34.7	28.6	42.9	0.2985
Chromebook	8.2	3.6	14.3	0.1752
Smartphone	79.6	82.1	76.2	0.6089
Other	0.0	0.0	0.0	—
No devices in the home	2.0	0.0	4.8	0.2433
How do you most often connect to the internet?	N = 47	N = 26	N = 21	0.7790
Home connect	87.2	88.5	85.7	
Public connect	0.0	0.0	0.0	
Cellular connect	12.8	11.5	14.3	
Do not connect	0.0	0.0	0.0	
Among Those Who Use Home Connect				
How often do you have problems with the speed, reliability, or quality of internet connection at home in a way that makes it hard to do things you need to do online?	N = 41	N = 23	N = 18	0.1135
Often	14.6	21.7	5.6	
Sometimes	19.5	26.1	11.1	
Rarely	46.3	30.4	66.7	
Never	19.5	21.7	16.7	
Don’t know	0.0	0.0	0.0	
Among Those Who Do Not Use Home Connect				
What is the most important reason why you do not connect to the internet at home?	N = 8	N = 5	N = 3	0.2717
Not available	12.5	20.0	0.0	
Internet cost	37.5	20.0	66.7	
Device cost	12.5	20.0	0.0	
I connect somewhere else	12.5	0.0	33.3	
I don’t want to	0.0	0.0	0.0	
Privacy/security	25.0	40.0	0.0	

Source: THIS-WIC Client Survey

[a] p-values are based on Chi-square test. For Chromebook, smartphone, no device, Internet access, Internet speed, and cost, 25 percent or more of the cells have expected counts less than 5, so Chi-square may not be a valid test.

[b] Percentages do not add up to 100 because respondents could select all that applied.

4.2.2 Comfort with Technology and Frequency of Videochat Use

Overall, two-thirds (66.7%) of survey respondents were very confident with the use of technology, with over a fourth being somewhat confident; no respondents indicated they were somewhat or very uncertain when it came to the use of technology (**Table 4-3**). About 61 percent of respondents used videochat daily to communicate with and stay connected with friends and family, and an additional 17.9 percent used it about once per week; 14.3 percent never used videochat to stay connected with friends and family.

Table 4-3. Comfort with Technology and Frequency of Videochat Use among Client Survey Respondents in SC

Comfort with Technology	Overall	Intervention	Comparison	p-value[a]
	%			
When it comes to the use of technology, which of the following best describes you?	N = 48	N = 27	N = 21	0.2244
Very confident	66.7	59.3	76.2	
Somewhat confident	27.1	29.6	23.8	
Neither confident nor uncertain	6.3	11.1	0.0	
Somewhat uncertain	0.0	0.0	0.0	
Very uncertain	0.0	0.0	0.0	
How often do you use video chat to communicate and stay connected with family and friends?	N = 28	N = 16	N = 12	0.5433
Daily	60.7	68.8	50.0	
2 times per week	0.0	0.0	0.0	
1 time per week	17.9	18.8	16.7	
2 times per month	0.0	0.0	0.0	
1 time per month	0.0	0.0	0.0	
Less than 1 time per month	7.1	6.3	8.3	
Never	14.3	6.3	25.0	

Source: THIS-WIC Client Survey

[a] p-values are based on Chi-square tests. For both variables, 25 percent or more of the cells have expected counts less than 5, so Chi-square may not be a valid test.

4.2.3 Administrative, Individual, and Staff-Level Barriers to Accessing WIC Services

Survey respondents reported barriers to accessing WIC services for their most recent WIC appointment. Barriers included administrative factors (such as receiving a specific appointment time and experiencing long wait times), individual factors (transportation, childcare, and getting off work); and staff interactions (such as language barrier, racial/ethnic barrier, and internet connectivity). As seen in **Table 4-4**, mean scores for all measures ranged from 2.5 to 3.0, indicating a low frequency of experiencing barriers. For all eight measures examined, no

differences were observed in frequency of barriers among respondents from intervention and comparison agencies.

Table 4-4. Barriers to Accessing WIC Services among Client Survey Respondents in Intervention and Comparison Agencies in SC

Barriers[a]	Intervention (N = 28)	Comparison (N = 21)	Δ (95% CI)	p-value[b]
	Mean (SE)			
Not given a specific appointment time	2.7 (0.17)	2.7 (0.19)	0.07, (-0.43, 0.58)	0.773
Wait too long	2.6 (0.15)	2.8 (0.18)	-0.15, (-0.63, 0.32)	0.519
Transportation issues	2.8 (0.10)	3.0 (0.11)	-0.17, (-0.47, 0.14)	0.275
Childcare issues	2.6 (0.16)	2.7 (0.18)	-0.11, (-0.60, 0.38)	0.642
Difficulty getting off work	2.5 (0.16)	2.8 (0.18)	-0.26, (-0.74, 0.23)	0.294
WIC staff language barrier	2.8 (0.10)	2.9 (0.11)	-0.06, (-0.37, 0.24)	0.681
WIC staff racial/ethnic barrier	2.6 (0.16)	2.7 (0.18)	-0.14, (-0.62, 0.34)	0.564
No or poor Internet connection	2.7 (0.14)	2.8 (0.16)	-0.09, (-0.51, 0.33)	0.652

Source: THIS-WIC Client Survey

Note: SE = standard error; CI = confidence interval

[a] On a scale of no/never to frequently, please mark (X) if you experienced any of the following barriers to attending your WIC appointment with response options: 0 = frequently, 1 = occasionally, 2 = a little, and 3 = never.

[b] Hierarchical linear regression models (unadjusted) were used to compare differences in means for intervention and comparison agencies.

4.3 Satisfaction with WIC Services

The unadjusted mean client satisfaction level was similar for Client Survey respondents from intervention agencies and comparison agencies (mean 90.4 vs. 93.5), reflecting similar satisfaction with WIC services delivered via TeleWIC and via usual care (**Table 4-5**). An adjusted model was not run because none of the demographic characteristics were significantly different between respondents in the intervention and comparison agencies.

Table 4-5. Satisfaction with WIC Appointment among Client Survey Respondents in Intervention and Comparison Agencies in SC

Client Satisfaction	Intervention (N = 28)	Comparison (N = 21)	Δ (95% CI)	p-value[b]
	Mean (SE)			
Client Satisfaction Index[a]	90.4 (1.98)	93.5 (2.29)	-3.10, (-9.19, 3.00)	0.312

Source: THIS-WIC Client Survey.

Note: SE = standard error; CI = confidence interval

[a] Client satisfaction index (range: 20−100) is based on 8 items (interitem correlation, alpha = 0.86)

[b] Hierarchical linear regression models (unadjusted) were used to compare differences in means for intervention and comparison agencies.

4.4 Intent to Change Dietary Behaviors

Respondents' intentions to change dietary behaviors after their most recent WIC appointment were comparable for Client Survey respondents in the intervention and comparison agencies. As seen in **Table 4-6**, mean scores for the three intentions measures ranged from 3.7 to 4.4, indicating that most respondents agreed or neither agreed nor disagreed with these statements.

Table 4-6. Intent to Change Dietary Behaviors Following the WIC Nutrition Education Lesson among Client Survey Respondents in Intervention and Comparison Agencies in SC

Statement[a]	Intervention (N = 28)	Comparison (N = 21)	Δ (95% CI)	p-value[b]
	Mean (SE)			
After my WIC nutrition education lesson, I wanted to change how I eat.	3.7 (0.17)	3.8 (0.19)	-0.10, (-0.62, 0.41)	0.688
After my WIC nutrition education lesson, I wanted to change how I feed my family.	3.8 (0.17)	3.7 (0.19)	0.14, (-0.38, 0.66)	0.583
My WIC nutrition education lesson taught me things that will help me choose nutritious foods for me or my family.	4.0 (0.17)	4.4 (0.19)	-0.46, (-0.98, 0.06)	0.079

Source: THIS-WIC Client Survey

Note: SE = standard error; CI = confidence interval

[a] Response options to dietary behavior change items included 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree.

[b] Hierarchical linear regression models (unadjusted) were used to compare differences in means for intervention and comparison agencies.

4.5 Daily Fruit and Vegetable Intake

After their appointment, respondents self-reported their daily fruit and vegetable intake in the Client Survey, with response options ranging from none to 4 or more cups. As seen in

Table 4-7, about 55 percent of respondents reported consuming 1 to 3 cups of fruits per day and 1 to 3 cups of vegetables per day. The distribution of daily fruit and vegetable intake was similar among respondents for the intervention and comparison agencies.

Table 4-7. Daily Fruit and Vegetable Intake among Client Survey Respondents, Overall and in Intervention and Comparison Agencies in SC

Variable	Overall	Intervention	Comparison	p-value[a]
		%		
Fruits per day	N = 45	N = 25	N = 20	0.3751
None	0.0	0.0	0.0	
1/2 cup or less	15.6	20.0	10.0	
1/2 to 1 cup	22.2	16.0	30.0	
1–2 cups	42.2	40.0	45.0	
2–3 cups	13.3	12.0	15.0	
3–4 cups	6.7	12.0	0.0	
4 or more cups	0.0	0.0	0.0	
Vegetables per day	N = 41	N = 22	N = 19	0.8071
None	7.3	9.1	5.3	
1/2 cup or less	0.0	0.0	0.0	
1/2 to 1 cup	31.7	31.8	31.6	
1–2 cups	31.7	27.3	36.8	
2–3 cups	22.0	27.3	15.8	
3–4 cups	7.3	4.5	10.5	
4 or more cups	0.0	0.0	0.0	

Source: THIS-WIC Client Survey

[a] p-values are based on Chi-square tests. For both variables, 25 percent of the cells have expected counts less than 5, so Chi-square may not be a valid test.

4.6 Summary of Findings: WIC Clients

WIC clients in the intervention agencies received services via TeleWIC. WIC clients in the comparison agencies received phone and in-person services. This chapter described client experience with telehealth services and resources and compared outcomes for clients in the intervention and comparison agencies. Key findings include the following:

1. **Acceptability of telehealth services and TeleWIC:** Client Survey respondents who received WIC services through a telehealth appointment found it acceptable (agree or strongly agree) to do so. More than 95 percent of respondents indicated that receiving WIC services via telehealth was easier than going to a WIC clinic and preferred to continue receiving services the same way at their next appointment.

2. **Barriers to accessing WIC services:** In general, most respondents had a computer, smartphone, and Internet connection at home. Additionally, most were very confident (66.7%) or somewhat confident (27.1%) about using technology; however, 13.3 percent had never used videoconferencing to communicate with family and friends. Respondents had favorable experiences with their appointments. There were no differences in the mean barrier scores for those in the intervention and comparison agencies for all eight barrier questions, likely because clients at comparison agencies received services via phone.
3. **Satisfaction with WIC appointment:** Consistent with the low frequency of barriers, respondents in the intervention and comparison agencies had comparable, high levels of satisfaction with their WIC appointment.
4. **Intent to change dietary behaviors:** Respondents in the intervention and comparison agencies have comparable scores (3.7 to 4.4 on a 5-point agreement scale) for intent to change their dietary behaviors (i.e., how they ate, how they feed their family) and the usefulness of lessons on how to make healthy choices (4.0 vs. 4.4 on a 5-point agreement scale for respondents from intervention and comparison agencies, respectively).
5. **Daily fruit and vegetable intake:** About 22 percent of respondents ate ½ cup to 1 cup of fruits, and about 42 percent ate 1 to 2 cups of fruits. Nearly one-third of the respondents consumed ½ to 1 cup of vegetables, and a similar percentage consumed 1 to 2 cups of vegetables. After respondents' WIC appointments, distribution of both fruit and vegetable intake was not significantly different for respondents from the intervention and comparison agencies.

5. Conclusions and Lessons Learned

Telehealth has emerged as an integral approach to offering healthcare services because it may offer enhanced access to services, convenience in scheduling and receiving services, and cost savings by eliminating the need for transportation. However, factors such as comfort level with digital technology, availability of internet, privacy and security concerns, and accessibility may be barriers to telehealth integration within WIC. The goal of the THIS-WIC project was to develop a robust evidence base regarding telehealth solutions in WIC and understand whether and how telehealth influences impact, intermediate, process, and cost outcomes.

SC designed and implemented TeleWIC to enhance access to WIC services, including high-risk nutrition care planning, breastfeeding education, breastfeeding support, and client high-risk assessment. TeleWIC allowed staff to provide services from a designated clinic instead of having to commute to several satellite clinics in a week.

5.1 Implementation of Telehealth Services in SC

Between March 2023 (Q1/2022) and September 2023 (Q3/2023), seven agencies offered telehealth services and served as intervention agencies; seven agencies offered usual care and served as comparison agencies. WIC staff acknowledged that “there will always be some sort of barrier” but providing clients with the TeleWIC option “knocks down barriers to access” and improves client retention. Although staff had relied on Teams or Zoom for appointments during the COVID-19 pandemic, they noted that clients were reluctant to move away from long-standing practices and adopt new technology.

All WIC staff received training before scheduling and conducting TeleWIC appointments. In the early phase, staff reported that TeleWIC was easy to use, but in the late phase mean scores for this indicator declined significantly. In addition, some staff did not feel prepared to provide telehealth services and noted that the training was compressed, and that they needed additional training to feel comfortable with the process of scheduling and conducting TeleWIC appointments. Others felt prepared and noted that the training was interactive and acknowledged that having the PowerPoint slide deck facilitated self-learning following the training. Between the early and late phase, staff reported that they did not schedule TeleWIC appointments on a weekly basis and preferred in-person appointments, as clients were often “no-show” or were in locations that made it inconvenient to turn on the video. Staff also described variability in telehealth use across clinics; those with fewer staff relied on TeleWIC more than those with adequate staff to schedule in-person appointments. Staff also expressed interest in simplifying the process for client log-in and including interpreters to serve the growing number of Hispanic and Portuguese clients.

Over the three quarters of project implementation, most TeleWIC appointments were scheduled in the second quarter; in any given quarter, about 60 percent of the scheduled TeleWIC appointments were completed via TeleWIC. All appointments were scheduled for 45 minutes, but the average duration actually ranged from 16 to 22 minutes, with slightly shorter

appointments in the earlier quarters. For the 54 completed appointments, 18.5 percent lasted 30 minutes or more. Staff indicated that the simultaneous rollout of scheduled and on-demand TeleWIC service options was challenging, as they had to learn two different systems. Staff preferred to begin with scheduled appointments before launching on-demand appointments. Staff also felt that there was need to integrate interpreters with TeleWIC service delivery to ensure that their Hispanic and Portuguese clients were receiving services.

In the early phase, about 88 percent of the staff reported that they had traveled to other WIC clinics before the COVID-19 pandemic, and in the late phase, about 63 percent reported that they had traveled to other WIC clinics before COVID-19 pandemic. The startup cost to offer telehealth services was $363,317, of which about 93 percent was spent on contracted services and 7 percent was spent on labor. In the 8th month of telehealth intervention, mean cost per enrollment had declined from $6 to $5 in both intervention and comparison sites. Mean cost per appointment had declined from $56 to $53 in intervention sites and from $66 to $61 in comparison sites.

5.2 Client Experience and Outcomes

Most Client Survey respondents had a computer and smartphone at home and were confident or somewhat confident about using technology; only 13.3 percent had not used videoconferencing to communicate with family and friends. Client Survey findings from the intervention agencies indicate that respondents found receiving WIC services via TeleWIC acceptable. Most respondents also preferred to continue receiving WIC services through telehealth for their next appointment. Respondents found TeleWIC easy to access and simple to use. Satisfaction scores were high and comparable for respondents in the intervention and comparison agencies. After their WIC appointments, respondents in the intervention and comparison agencies had comparable intent to change dietary behaviors or daily fruit and vegetable intake.

5.3 Lessons Learned

Telehealth is a viable approach to deliver WIC services to clients. Telehealth services can involve a phone-based appointment. Comprehensive training is essential to preparing staff for providing telehealth services, understanding the logistics of setting up appointments, helping clients set up accounts and navigate the resources, and marketing/promoting the resources to clients. Staff note that offering TeleWIC appointments gives clients flexibility in how they would like to receive WIC services.

WIC leadership engagement and support, at both the local and State agency levels, are critical for staff uptake. During the course of the project, SC WIC experienced changes in leadership on the State agency project team, which may have impacted implementation and rollout. Despite integration with the MIS, staff noted variability in TeleWIC use across clinics, with higher use at clinics with fewer staff. They noted that getting buy-in from all staff is critical to ensuring consistent use across all clinics. However, staff experienced challenges during implementation, stemming from insufficient training, extended appointment time, and client preferences.

Staff were neutral about scheduling TeleWIC. The small number of staff who used the video functionality appreciated the rapport-building and connections with the clients, which ultimately lead to better engagement. Clients who completed an appointment via telehealth preferred to receive services the same way for future appointments.

5.4 Implications

Telehealth is a relatively new approach to serving WIC clients, and findings from this evaluation demonstrate the potential of increasing reach, promoting participation, and reducing attrition. The high level of satisfaction with WIC services among Client Survey respondents in the intervention agencies demonstrates the feasibility of delivering remote services successfully. Additional studies and evaluations are needed to demonstrate its efficacy, particularly as WIC resumes offering in-person services (i.e., usual care). Understanding and deploying strategies to increase awareness, comfort, and use of TeleWIC synchronously may increase the percentage of appointments scheduled and completed. The findings from this evaluation suggest that flexibility in providing telehealth services is essential. Hands-on, interactive training focused on the process and promotion of telehealth platform resources may lead to increased use of telehealth among staff. Additionally, insufficient time to become familiar with the TeleWIC platform was a barrier to staff, as was simultaneous rollout of scheduled and on-demand TeleWIC service options, which extended learning time. Staff expressed preference to begin with scheduled appointments before launching on-demand appointments. Staff also felt that there was need to integrate interpreters with TeleWIC service delivery to ensure that their Hispanic and Portuguese clients were receiving services.

The findings on the cost of ongoing service delivery should be interpreted with caution. First, to assess changes in service delivery costs associated with telehealth implementation, the pre-implementation period was set to FY2019, before the start of the COVID-19 pandemic, because services in both intervention and comparison agencies were remote during the height of the pandemic. This resulted in a 3.5-year gap between the study pre-implementation and post-implementation periods. Changes in staffing and reporting systems during this period may have affected the quality of the data reported for the pre-implementation period in both intervention and comparison agencies. Other factors and changes in service delivery (beyond implementation of the telehealth solution) may have also affected the costs incurred during the post-implementation period. Most importantly, comparison agencies continued to offer telephone-based services to their clients during the post-implementation period.

Additionally, agency-level costs can vary for reasons beyond telehealth or traditional delivery models, such as socioeconomic composition of the clients, geographical differences, or provider turnover. For example, agencies that experience higher provider turnover may have higher costs because additional resources are spent on recruiting, hiring, training, and onboarding new staff. Studies with a larger sample size can statistically control for these confounding factors, but in this study, with a limited sample size, this was not possible. Therefore, in addition to the limitations noted above, the changes in costs among telehealth and comparison agencies may be caused by other factors unrelated to the mode of delivery, such as changes in staffing, the

level of services or administrative tasks that agencies are required to provide, and WIC participation.

5.5 Strengths and Limitations

This evaluation has several strengths and limitations. Some strengths of the evaluation include the mixed methods design, emphasis on effectiveness and implementation outcomes, relatively large number of participating agencies, and WIC staff and client participation in the evaluation. The evaluation employed a group randomized-controlled design that included staff and clients from 14 agencies. SC WIC identified WIC clinics with declining rates of WIC participation and randomly selected seven intervention and seven comparison agencies from two regions of the State. In addition, the telehealth intervention targeted high-risk WIC clients, providing insights into the feasibility of improving WIC service delivery for this population. Finally, SC WIC encountered delays and challenges during the development and implementation of the telehealth solution, and findings reflect real-world barriers, facilitators, and potential outcomes from using telehealth in WIC settings.

This evaluation has several limitations. The COVID-19 pandemic reshaped usual care service delivery; in-person appointments were replaced with phone appointments. Thus, the mode of service delivery was phone and TeleWIC for intervention agencies and phone/in-person for comparison agencies. Insufficient training, increased appointment duration, and low client engagement resulted in limited capacity to promote telehealth use among clients in the intervention agencies.

In addition, TeleWIC services were offered for a short duration (7 months), and it is likely that client and staff buy-in would increase over time. The sample sizes for the Staff and Client Surveys were low, and results should be interpreted with caution. During interviews, staff discussed positive aspects of TeleWIC, but survey responses did not fully align with these discussions—likely because the surveys were anonymous, but the interviews were not. Finally, TeleWIC was used for scheduled and on-demand appointments, but the metadata did not support analysis to examine differences in completion rates for scheduled vs. on-demand appointments.

Comparable client-/respondent-level outcomes in the intervention and comparison agencies should not be interpreted as evidence of the absence of improvements. In addition to the similarity in mode of service delivery, it is possible that implementing the intervention in the absence of the COVID-19 pandemic may have produced different results. Additional studies are needed to evaluate the effectiveness of telehealth services compared with in-person appointments, assess factors that affect synchronous use of resources during appointments, and characterize client perspectives on facilitators and barriers to using resources via a telehealth platform.

5.6 Sustainability

SC WIC considers WIC telehealth a viable option for serving WIC clients. After the THIS-WIC evaluation, SC WIC planned for a statewide rollout of TeleWIC, including plans for additional

and ongoing training of staff to support staff buy-in and adoption, and promotion of TeleWIC to WIC clients including development of guides on how to use TeleWIC. SC WIC is considering opportunities for expanding use of TeleWIC for other services, potentially including the nutrition portion of certification. In addition, SC WIC and GCOM are exploring adding functionality to TeleWIC, including expanding text messaging to include other clinic communications (e.g., automated registration and appointment reminders, general communication) and supporting more appointment types and tasks, including signature capture, WIC client document upload (e.g., proof of eligibility), language support, and group education. Finally, SC WIC is exploring enhanced functionality to be able to provide peer counseling on demand.

References

1. H.R. 648 - Consolidated Appropriations Act, 2019 116th Congress (2019-2020). Retrieved from https://www.congress.gov/bill/116th-congress/house-bill/648/text

2. U.S. Department of Agriculture. WIC Data Tables, Annual State Level Data, Total Participation. Retrieved from https://www.fns.usda.gov/sites/default/files/resource-files/26wifypart-3.pdf.

3. U.S. Department of Agriculture, Food and Nutrition Service. (2023). National and State Level Estimates of WIC Eligibility and Program Reach in 2020. Retrieved from https://www.fns.usda.gov/research/wic/eligibility-program-reach-estimates-2020

4. Fatehi, F., Smith, A. C., Maeder, A., Wade, V., & Gray, L. C. (2017). How to formulate research questions and design studies for telehealth assessment and evaluation. *Journal of Telemedicine and Telecare, 23*(9), 759-763.

5. Au, L. E., Whaley, S., Rosen, N. J., Meza, M., & Ritchie, L. D. (2016). Online and in-person nutrition education improves breakfast knowledge, attitudes, and behaviors: a randomized trial of participants in the special supplemental nutrition program for women, infants, and children. *Journal of the Academy of Nutrition and Dietetics, 116*(3), 490-500.

6. Nestor, B., McKenzie, J., Hasan, N., AbuSabha, R., & Achterberg, C. (2001). Client satisfaction with the nutrition education component of the California WIC program. *Journal of Nutrition Education, 33*(2), 83-94.

7. Weber, S., Uesugi, K., Greene, H., Bess, S., Reese, L., & Odoms-Young, A. (2018). Preferences and perceived value of WIC foods among WIC caregivers. *Journal of Nutrition Education and Behavior, 50*(7), 695-704.

8. Agha, Z., Schapira, R. M., Laud, P. W., McNutt, G., & Roter, D. L. (2009). Patient satisfaction with physician–patient communication during telemedicine. *Telemedicine and e-Health, 15*(9), 830-839.

9. Chai, L. K., Collins, C. E., May, C., Brown, L. J., Ashman, A., & Burrows, T. L. (2021). Fidelity and acceptability of a family-focused technology-based telehealth nutrition intervention for child weight management. *Journal of Telemedicine and Telecare, 27*(2), 98-109.

10. Parmanto, B., Lewis Jr, A. N., Graham, K. M., & Bertolet, M. H. (2016). Development of the telehealth usability questionnaire (TUQ). *International Journal of Telerehabilitation, 8*(1), 3.

11. Woelfel, M. L., Abusabha, R., Pruzek, R., Stratton, H., Chen, S. G., & Edmunds, L. S. (2004). Barriers to the use of WIC services. *Journal of the American Dietetic Association, 104*(5), 736-743.

12. United States Census Bureau. (2013). *American Community Survey*. Retrieved from https://www.census.gov/acs/www/about/why-we-ask-each-question/computer/

13. Woods, S. S., Schwartz, E., Tuepker, A., Press, N. A., Nazi, K. M., Turvey, C. L., & Nichol, W. P. (2013). Patient experiences with full electronic access to health records and clinical notes through the My HealtheVet Personal Health Record Pilot: qualitative study. *Journal of Medical Internet Research, 15*(3), e2356.

14. Pew Research Center. (2021). *The Internet and the Pandemic*. Retrieved from https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2021/09/PI_2021.09.01_COVID-19-and-Tech_TOPLINE.pdf

15. Pew Research Center. (2021). *Mobile Technology and Home Broadband 2021*. Retrieved from https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2021/06/PI_2021.06.03_Mobile-Broadband_TOPLINE.pdf

16. Kakulla, B. (2021). *AARP 2021 Tech Trends*. Retrieved from https://www.aarp.org/content/dam/aarp/research/surveys_statistics/technology/2021/2021-tech-trends-older-adults.doi.10.26419-2Fres.00420.001.pdf

17. Office of Management and Budget. *Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity*. Retrieved from https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf

18. WIC Infant and Toddler Feeding Practices Study 2: Fourth Year Report. Appendix A Study Research Questions 2020. Retrieved from https://fns-prod.azureedge.net/sites/default/files/resource-files/WIC-ITFPS2-Year4Report-Appendix.pdf

19. Yaroch, A. L., Tooze, J., Thompson, F. E., Blanck, H. M., Thompson, O. M., Colón-Ramos, U., Shaikh, A. R., McNutt, S., & Nebeling, L. C. (2012). Evaluation of three short dietary instruments to assess fruit and vegetable intake: the National Cancer Institute's food attitudes and behaviors survey. *Journal of the Academy of Nutrition and Dietetics, 112*(10), 1570-1577.

20. Shiferaw, K. B., Mengiste, S. A., Gullslett, M. K., Zeleke, A. A., Tilahun, B., Tebeje, T., Wondimu, R., Desalegn, S., & Mehari, E. A. (2021). Healthcare providers' acceptance of telemedicine and preference of modalities during COVID-19 pandemics in a low-resource setting: An extended UTAUT model. *Plos One, 16*(4), e0250220.

21. Zhu, D., Paige, S. R., Slone, H., Gutierrez, A., Lutzky, C., Hedriana, H., Barrera, J. F., Ong, T., & Bunnell, B. E. (2024). Exploring telemental health practice before, during, and after the COVID-19 pandemic. *Journal of Telemedicine and Telecare, 30*(1), 72-78.

22. Rho, M. J., young Choi, I., & Lee, J. (2014). Predictive factors of telemedicine service acceptance and behavioral intention of physicians. *International Journal of Medical Informatics, 83*(8), 559-571.

23. Gao, S., Krogstie, J., & Siau, K. (2011). Developing an instrument to measure the adoption of mobile services. *Mobile Information Systems, 7*(1), 45-67.

24. Becevic, M., Boren, S., Mutrux, R., Shah, Z., & Banerjee, S. (2015). User satisfaction with telehealth: study of patients, providers, and coordinators. *The Health Care Manager, 34*(4), 337-349.

25. Cates, S., Capogrossi, K., & Sallack, L. (2016). WIC Nutrition Education Study: Phase I Report. Alexandria, VA: United States Department of Agriculture. Food and Nutrition Service, Office of Policy Support.

26. Anderson, A. E., Henry, K. A., Samadder, N. J., Merrill, R. M., & Kinney, A. Y. (2013). Rural vs urban residence affects risk-appropriate colorectal cancer screening. *Clinical Gastroenterology and Hepatology, 11*(5), 526-533.

27. Glasgow, R. E., Harden, S. M., Gaglio, B., Rabin, B., Smith, M. L., Porter, G. C., Ory, M. G., & Estabrooks, P. A. (2019). RE-AIM planning and evaluation framework: adapting to new science and practice with a 20-year review. *Frontiers in Public Health, 7*, 64.

28. Keith, R. E., Crosson, J. C., O'Malley, A. S., Cromp, D., & Taylor, E. F. (2017). Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: A rapid-cycle evaluation approach to improving implementation. *Implementation Science, 12*, 1-12.

29. Waltz, T. J., Powell, B. J., Matthieu, M. M., Damschroder, L. J., Chinman, M. J., Smith, J. L., Proctor, E. K., & Kirchner, J. E. (2015). Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: results from the Expert Recommendations for Implementing Change (ERIC) study. *Implementation Science, 10*, 1-8.

30. Chang, H. (2015). Evaluation framework for telemedicine using the logical framework approach and a fishbone diagram. *Healthcare Informatics Research, 21*(4), 230.