Child and Adult Care Food Program (CACFP) Family Day Care Homes Meal Claims Feasibility Study

Final Report

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MANHATTAN STRATEGY GROUP

4340 East-West Highway
Suite 1100
Bethesda, MD 20814
Office: 301.828.1515
Fax: 301.828.1506
www.manhattanstrategy.com

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Executive Summary

Under the Improper Payments Elimination and Recovery Improvement Act (IPERIA) of 2012, agencies must periodically review and identify programs that may be susceptible to significant improper payments.[1] The Child and Adult Care Food Program (CACFP), which reimburses program providers for nutritious meals and snacks served to eligible enrollees for care in child care centers, day care homes, and adult day care centers, is subject to this review. This feasibility study focuses on meal claims made by CACFP family day care homes (FDCHs). According to the United States Department of Agriculture (USDA), Food and Nutrition Service (FNS), FDCHs served more than 458 million meals and snacks in FY 2018 to approximately 4.63 million children.[2]

FNS administers CACFP through grants to States. Independent centers and sponsors sign agreements with States to assume administrative and financial responsibility for CACFP operations. Sponsors ensure that FDCHs meet the CACFP eligibility criteria, comply with applicable Federal and State regulations, and offer training and support to providers. Sponsors receive and verify meal reimbursement claims, submit claims to State CACFP offices, receive reimbursement payments, and distribute payments to FDCHs.

Providers at FDCHs offer a safe, home-based day care setting for families and provide CACFP-eligible children with access to nutritious food meeting USDA dietary guidelines. To participate in the CACFP, FDCHs must be supported by a sponsor; abide by the policies and procedures of USDA, the State agency, and the sponsor; attend sponsor and State agency training; and participate in monitoring visits.

The purpose of this feasibility study is to design and test a data collection method that enables FNS to estimate improper payments (IP) due to meals claimed improperly by FDCHs participating in CACFP. Specifically, the study focuses on accurately measuring meals that are claimed but not served. If feasible, the data collection method needs to be viable for potential national-level implementation.

To fulfill the study purpose, FNS contracted with Manhattan Strategy Group to design, develop, and test the use of digital instruments to facilitate the verification of meal claims. These instruments, the Meal Service Reporting System (MSRS) and the Child Attendance Reporting System (CARS), collect accurate meal-serving and child-attendance information from FDCH providers and parents without intruding into the routine practices of FDCH homes. MSRS allows providers to report meal-serving times for each child in attendance through a user-friendly smartphone mobile application or a website alternative. It does not replace current procedures that providers use to file their monthly meal claims. CARS allows parents to report daily drop-off and pick-up times of their children through a simple real-time text messaging system. We used data collected from MSRS and CARS, in combination with secondary data collected from sponsors, to approximate IP through data triangulation and an experimental study. We tested our data collection methods on a random sample of FDCHs in two States to determine the validity of the

[1] Public Law 111–204, Sec. 2. (a) (1), retrieved from https://www.govinfo.gov/content/pkg/PLAW-111publ204/pdf/PLAW-111publ204.pdf on May 13, 2019.

[2] Retrieved from https://fns-prod.azureedge.net/sites/default/files/pd/ccsummar.pdf on June 24, 2018.

method. We analyzed data collected from this field test to estimate the magnitude of improper claims that may result in IP and calculated the expected dollar amount of IP.

This report describes the design and development of MSRS and CARS, the implementation of the two instruments in a field test, and the estimates of IP based on data collected from the field test. We discussed the prospective applicability of the methods and recommendations for a national scale-up study.

Methods to Estimate IP

This study relied on two approaches to estimate improper payments: a triangulation-based approach from sample-specific data and a difference-in-differences model that used inferential statistics for the estimates. Similar conclusions from the two approaches prove` the validity of the IP estimates.

Triangulation. Triangulation refers to the process of using multiple data sources to verify a meal claim. The approach assumes that improper claims exist even after sponsors edit the claims, avoiding some potential improper payments, and State agencies review the sponsor-edited claims before issuing reimbursement. The triangulation-based approach to identifying improper claims, however, does not take into consideration that meal claims may fluctuate across months in the business-as-usual condition.

To control for this natural fluctuation over time and differentiate it from any change in meal claims when MSRS and CARS are implemented, we used a rigorous pre-post experimental design for testing the effectiveness of the treatment to improve the accuracy of meal claims. Specifically, we used an experimental design with a treatment condition and control condition. Under the treatment condition, the providers used MSRS to report meal-serving times, and parents used CARS to report absence, drop-off, and pick-up times of their children. Data reporting took place daily, and often in real time to ensure the accuracy of recall. We did not inform providers and parents in the control group of the study to preserve routine practices in a business-as-usual condition.

Modeling. Difference-in-differences (DD) modeling is a statistical technique to compare observed data from a treatment group—in this case, data reported during the study month using MSRS and CARs—with a comparison group that uses routine reporting procedures for meal serving and child attendance. Providers in the comparison group was in the business-as-usual condition throughout the study. Providers in the treatment group was in the business-as-usual condition in the pre-study months and used MSRS in the study month. We used the model to test whether the data collected would yield a proxy of overclaims based on the hypothesis that our intervention would result in more accurate data on meal reporting compared to the control group during the study month.

The focus of the DD modeling was to determine if the two groups' difference in their between-period differences in meal claims was substantial and statistically significant. The DD modeling statistically controls for the time effects (i.e., changes in meal claims across the months due to factors other than the intervention) and the two groups' background differences (enrollment size and rural-urban location), producing strong evidence validating the feasibility study, relative to many other analytic approaches.

Study Findings

For both approaches, we report improper claims for breakfast, lunch/supper (combined due to a common reimbursement rate), and snacks, and in total. The triangulation approach shows that overclaims (meals claimed but not served) were 19.4 percent for breakfast, 18.3 percent for lunch/supper, 23.5 percent for snacks and 20.6 percent across all meal types. The dollar value of overclaims was similar at 20.0 percent for all meal types. The DD modeling shows similar results, i.e., 18.3 percent of claims are overclaims, with an estimated range of 12.2 to 24.5 percent overclaims at the 95 percent confidence level.

The data collection methods are viable as tested in this feasibility study. Without a nationally representative sample, however, the error rates generated from data in this feasibility study are rather preliminary. While these estimates of error rates for overclaims may exceed the 10 percent threshold set in IPERIA as a compliance measure, they have two critical limitations. First, the rates are based on a study sample that is not representative of the population. Second, these rate estimates include overclaims due to failure to comply with allowable meal serving time or exceeding the maximum number of children in attendance, as set by their States. If we excluded overclaims related to these two causes, the overclaims rates would be lower than 10 percent. FNS will need to clarify standards to apply State and local policies to count improper claims for federal reporting consistently.

Conclusions

The data collection methods designed for measuring IP are **effective and feasible for large-scale implementation** with a nationally representative sample of sponsors and providers. This feasibility study also establishes the validity of data collection using MSRS and CARS. These initial estimates serve to guide policies about program compliance and integrity to better serve the CACFP community. In summary, we found that:

- Providers were able to use the smartphone version of MSRS to make timely reports of meal-serving times. Sufficient incentives and targeted technical assistance are essential to encourage the use of MSRS in addition to existing reporting systems.
- Parents adapted readily to the use of the CARS text messages to report child drop-off and pick-up times. Reminders and sufficient incentives are necessary for their sustained use

Recommendations

Based on the practices and lessons learned from the feasibility study, we make the following recommendations for a national study to measure improper meal claims in FDCHs.

Required participation: FNS should consider how to enforce required participation. Active State engagement of sponsors and providers may help, especially when combined with contractor technical assistance in onboarding their participation.

Incentives: Behavioral science confirms that financial incentives are highly effective in gaining participation. The digital distribution of electronic gift cards was effective and reliable.

- There was no provision for incentives to sponsors in the feasibility study. FNS should strongly consider implementing **incentives for sponsor** participation and requesting that

they help in the recruitment of providers. Otherwise, many sponsors may not have the staff to take on additional responsibilities, even for a limited time.

- The feasibility study provided only **modest financial incentives for providers**. FNS reduced the incentive from $100 proposed by the contractor to $60. Without an effective incentive mechanism, it will be challenging to collect data from providers.
- The **modest financial incentive for parents,** $25, was of limited value in gaining the participation of parents, who have no direct relationship with CACFP or FNS and cannot be required to participate. As such, sufficient incentives are essential for a successful national study.

Time to prepare for study implementation: Providers and parents need at least one week to access and familiarize themselves with MSRS and CARS before they begin using them. Providers need additional time to communicate with parents about the study.

Technical assistance: Offer robust technical assistance via instructional video, study hotline, email, text messaging, and social media to onboard providers and parents. MSG staff used these communication channels to assist providers and relied on text messaging and telephone to communicate with parents. Parents needed little assistance after their initial use of CARS.

1. Overview of the Feasibility Study

Under the Improper Payments Elimination and Recovery Act of 2010, agencies must "periodically review… and identify all programs and activities that may be susceptible to significant improper payments." The Child and Adult Care Food Program (CACFP), which reimburses program providers for nutritious meals and snacks served to eligible enrollees for care in childcare centers, day care homes, and adult day care centers, is subject to this review.

This feasibility study focuses on meal claims made by CACFP family day care homes (FDCHs). CACFP reimburses eligible FDCHs for the costs of providing nutritious meals and snacks to children from low-income families. According to the United States Department of Agriculture (USDA), Food and Nutrition Service (FNS), FDCHs served more than 485 million meals and snacks in FY 2017 to approximately 4.53 million children.[3]

The purpose of this feasibility study is to design and test a data collection method that enables FNS to estimate improper payments (IP) due to meals claimed improperly by FDCHs participating in CACFP. Specifically, the study focuses on accurately measuring meals that are claimed but not served. If feasible, the data collection method needs to be viable for potential national-level implementation in the future.

FNS administers CACFP through grants to States. Independent centers and sponsors sign agreements with States to assume administrative and financial responsibility for CACFP operations. Sponsors are responsible for ensuring that homes meet the CACFP eligibility criteria, providing training and other support, and monitoring the homes to ensure compliance with applicable Federal and State regulations. Sponsors receive and verify meal reimbursement claims, submit claims to State CACFP offices, receive reimbursement payments, and distribute payments to FDCHs.

Providers at FDCHs offer a safe, home-based day care setting for families and provide CACFP-eligible children with nutritious food meeting USDA dietary guidelines. To participate in the CACFP, FDCHs must be supported by a sponsor; abide by the policies and procedures of USDA, the State agency, and the sponsor; attend sponsor and State agency training; and participate in monitoring visits.

To fulfill the study purpose, we designed and developed digital instruments, the Meal Service Reporting System (MSRS) and the Child Attendance Reporting System (CARS), to collect meal-serving and child-attendance information from FDCH providers and parents, without intruding into the routine practices at the FDCH. We used data collected from MSRS and CARS, in combination with secondary data collected from sponsors, to approximate IP through a data triangulation approach and error estimates inferred from difference-in-differences models. We tested our data collection methods on a random sample of 283 FDCHs in two States to determine the validity of the method. We analyzed data collected from a field test to estimate the magnitude of improper claims that may result in IP and calculated the expected dollar amount of IP.

[3] Retrieved from https://fns-prod.azureedge.net/sites/default/files/pd/ccsummar.pdf on March 27, 2018.

In this report, we describe:

- the approach to designing and developing the technology-assisted data collection instruments through pilot tests;
- the design of the field test;
- the operation of data collection during field testing; and
- the procedure for calculating improper payments.

The digital instruments are fundamental to the feasibility study as they provide a means for the accurate estimation of IP in FDCH meal claims. We describe the design and development of the two technologies in Section 2.0. In Section 3.0, we describe the implementation of the feasibility test, including the recruitment of participants and the collection of administrative data and primary data using MSRS and CARS. In Section 4.0, we describe our approach to processing the data from multiple sources. We report the estimation of errors in meal claims and the payment for these errors in Section 5.0. In Section 6.0, we present the conclusion of the feasibility study and make recommendations for the approach in a prospective scale-up to assess IP in a nationally representative sample.

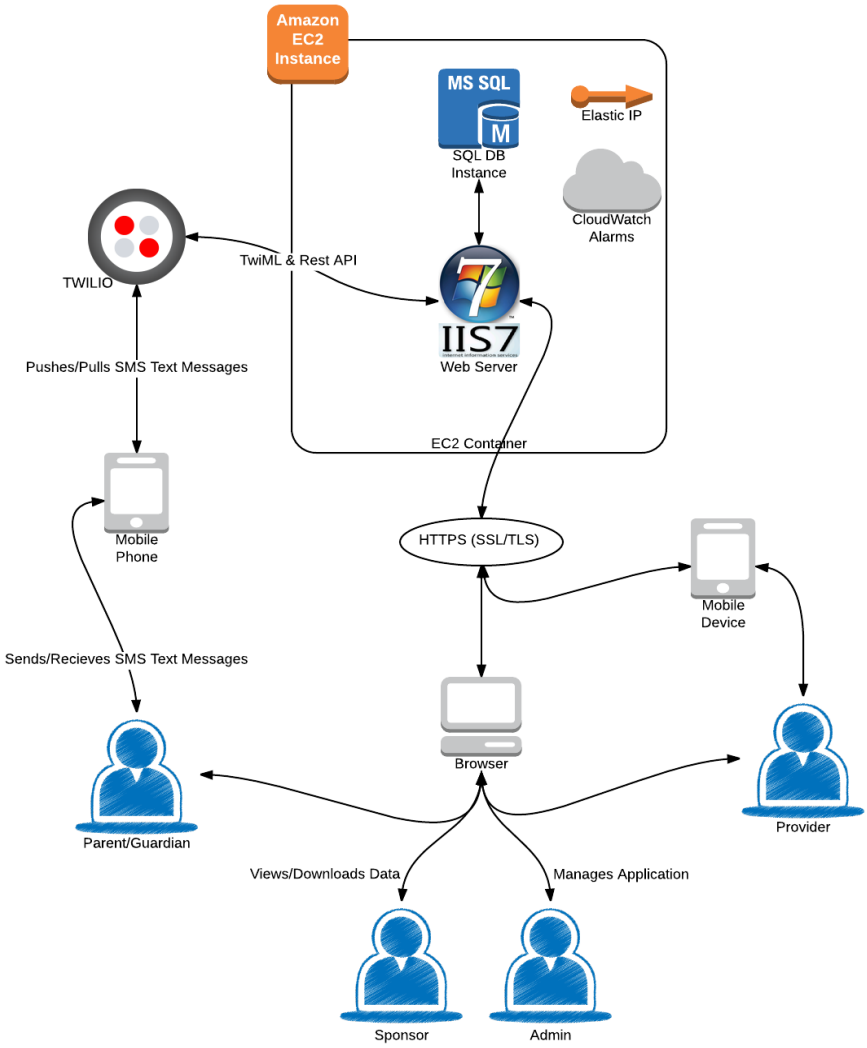
2. Development of Data Collection Instruments

Improper payments are based on meal claim errors. To capture these errors, we designed two instruments to collection data from daycare home providers and parents whose children attend these day cares. In this chapter, we provide detailed descriptions of the features and development process for the MSRS and CARS data collection instruments. MSRS was designed for providers to report meal-serving times through a smartphone mobile application or a website. It does not replace the current procedures that providers use to file their monthly meal claims. CARS collects the child's daily attendance from parents through a text messaging system or a website.[4] The applications, available in English and Spanish, allow providers to report meal-serving time and parents to report child attendance, both in real time. The data collected through the user instruments are transmitted to a central database and stored there to allow for monitoring by system administrators.

Exhibit 1 illustrates the architecture and components of the technology-assisted data collection process. The center portion of the diagram, in the black rounded rectangle, represents the server architecture for the website and database. Three data flows are represented in the remainder of the diagram. The left side of the diagram depicts how parents/guardians use CARS, a short message service (SMS) solution through a cloud service or a web browser, to communicate with the server. The lower right side of the diagram depicts how the provider can use either the mobile application or a browser to submit data to MSRS. The lower middle section of the diagram demonstrates how the administrator, Manhattan Strategy Group (MSG), uses the browser to view data in a web-based format. If interested, sponsors may view the meal-serving times reported by providers they supervise. Additionally, all mobile and web-based communication passed through Secure Sockets Layer/Transport Layer Security (SSL/TSL) encryption algorithms during data transmission.

[4] MSG considered an interactive voice response (IVR) option but believed it was not warranted and did not include it in the design. Based on available evidence in and shortly before 2014, access to a cell phone or computer was high. About 88 percent of American adults had a cell phone, and both African Americans and English-speaking Latinos had adoption rates that were comparable to the national average for all Americans (Zickuhr & Smith, 2012). Among poverty-level households, most had only cell phones (no landlines), as did nearly half of near-poverty households (Blumberg & Luke, 2013). For populations with an annual household income below $30,000, nearly half had smartphones and Internet use and smartphone ownership rates for African Americans and Latinos were comparable to those of whites (Smith, 2014). By the time of data collection in November 2017, we found that cell phone access was universal among CAFCP parents recruited for the study.

Exhibit 1. ***Technology-Assisted Data Collection Process***



2.1 Application Development Process

Users accessed these data collection tools through four interfaces: (1) CARS SMS, (2) CARS website, (3) MSRS mobile application, and (4) MSRS website. The underlying code and database structure use common services and aid each platform (web/SMS/mobile) in saving and retrieving information to and from the same central database. The development of this application consisted of two unique phases described below:

Design. The design phase encompassed the conceptual design, functional design, and graphical design tasks. The products of this phase were informal and internal conceptual design documents, formal functional specifications (System Design Document), and a set of graphical screen mockups showcasing how each main feature of each of the four applications would look.

Development. The development phase consisted of multiple internal iterations to produce a complete, functional, and tested set of technologies for delivery as CARS and MSRS. The work products of this phase were the four unique technologies that meet the agreed-on graphical and

functional design specifications: CARS SMS, CARS website, MSRS mobile application, and MSRS website.

2.1.1 Meal Service Reporting System (MSRS) for Providers

The objective of MSRS is to capture meal-serving time as close as possible to the actual time when the meal is served by the provider, minimizing human error in recalling and reporting. MSRS collects meal-serving times with an advanced notification/alert system to send reminder messages to the providers if they have not provided any information (i.e., home closure or meal-serving time) by 7:00PM. Providers are not able to log meal-serving times for a previous day. A web-based MSRS is also available for providers as an alternative method of reporting. The smartphone application and the website collect identical information and are stored centrally in the same database.

MSRS Functionality. MSRS allows providers to report in real time when meals are served to each child. It also allows providers to manage child enrollment status, report closures, and view the history of meals served. Exhibit 2 specifies additional information on the features of MSRS.

Exhibit 2. ***Features of MSRS***

Feature	Description
Enrollment	MSG staff enrolled providers and sent them with a username and PIN via email along with instructions on how to download the mobile app and access the website.
Authentication	Providers authenticate themselves into the system using a provider ID and PIN that MSG sends to them via email.
Log Meal-serving Times	Providers log meal times for each child and every meal served. Meal times can be logged by selecting multiple children and then clicking on a "Serving Now" button to log meals in a batch. Meal times can be changed before clicking "Serving Now," in the event that the FDCH is late logging the meal. Meal times can be changed on a child-by-child basis to correct data entry errors.
View History	The provider can view the meal log history for the duration of the field test by browsing the daily meal claims for each day.
Notification – Meal Logging	A notification is sent to the provider when no meals have been logged and the ending time of meal serving period is approaching.
Notification – No Data	A notification is sent to the provider when no meals have been logged for the day. The goal is to continuously prompt the provider to log meal times in as close to real time as possible.
Day Care Closed	An option is provided to allow the provider to inform MSRS that the day care was closed.
Help	An option is provided for assistance through a toll-free phone line.
Time Zone	The time zone reflects the providers' time zone.
Child Management	Providers can manage the child enrollment status by marking a child as "inactive" or reactivating a child who returns to the day care. When a child is inactive, no data are reported. When a child is reactivated, data collection resumes as normal.
Language Support	Content is provided in English and Spanish. Providers choose their preferred language during enrollment, but the two language choices can also be toggled within the application.

2.1.2 Child Attendance Reporting System (CARS) for Parents

CARS is an SMS- and web-based reporting solution that allows parents and guardians to report the drop-off and pick-up time of a child, even for a child who may leave the day care home and return later in the day.[5] CARS is designed to collect attendance data from parents through a text messaging system or an online reporting website. The text messaging system is compatible with multiple technology platforms. It provides a reliable source of data that can be used to validate meal claims.[6] Parents report the time they drop off and pick up their children by simply sending text messages to CARS in the specified formats or submitting the information on the CARS website.

All parents participating in the study had access to a mobile phone to receive and respond to text messages; a smartphone is not necessary for CARS as long as the mobile phone can receive and send text messages. The text messaging system for CARS sends two reminder text messages to a child's parent each day, to inquire about the time the child is dropped off and picked up. The messaging system has preloaded information from the sponsors' databases to ensure that text messages are delivered to parents. Parents were asked to confirm the name and current enrollment status of their child and their mobile phone number when they agreed to participate in the month-long study.

CARS Functionality. MSG built the SMS-based data collection system on SMS services provided by Twilio, which allows us to build custom processing webpages to handle information, such as saving information to a database and responding back to the user via SMS text. Exhibit 3 summarizes the features of CARS.

Exhibit 3. ***Features of CARS***

Feature	Description
Enrollment in CARS System	Parents/guardians are pre-enrolled in the CARS system and prompted to confirm their enrollment via SMS text and/or email messages. During this enrollment, parents set up a password to access their web-based account.
Authentication	Parents/guardians are authenticated through their enrollment in the SMS system, or by logging into the web-based system with their mobile number and password.
Multiple Accounts	The system handles enrollment of multiple persons by associating different mobile numbers with the same children. Data provided by any of the parents/guardians are stored in the same central account and associated with the same child(ren).
Log Drop-off Time	Parents provide drop-off times of children by either sending an SMS text or entering time in the web application.
Log Pick-up Time	Parents provide pick-up times of children by either sending an SMS text or entering time in the web application.

[5] Parents of children who leave for school and return after school by school bus are not expected to report bus times. Instead, they report them upon initial enrollment in CARS and on any days when school schedules change.

[6] Depending on their plan with a cell phone carrier, some parents may incur additional text message charges. These charges tend to be modest and will more than be compensated by the $25 incentive offered to parents participating during the study month.

Feature	Description
Send Notifications	System notifies parents when any of the following triggers are instantiated: • The parents/guardians have not logged a drop-off time AND the time is one hour past their normal drop-off time. • The parents/guardians have not logged a pick-up time AND the time is one hour past their normal pick-up time.
Absences	Parents report absences to CARS any time during the day, or in response to an SMS text sent to them from CARS.
Account Management	Parents/guardians can set up and maintain their profile information including name, mobile number, and email address.
Help	Parents receive online instructional materials and a method of ad hoc assistance in the form of a toll-free support line.
Language Support	CARS is available in English and Spanish. Parents can select their language preferences during enrollment. The languages can be toggled within the web application.
Security	Data collected and stored in the web server are encrypted.[7] Personal identifying information is stored offline, and records are matched on the proprietary identifier created as part of the data collection process.

2.2 Confidentiality, Data Quality, and Security

Each web-based or mobile application includes progressive validation and logic checks as data are recorded by participants, with some exceptions. For CARS, the application provides logic checks that prohibit skipped data and confirm the times as AM or PM. It includes an administrative function that identifies problematic cases and specifies the resolution required and then documents the follow-up taken to resolve the issue.[8] This administrative system supports data quality by minimizing both inaccurate data and parental nonresponse. For MSRS, the validation checks are limited to logic and typographical errors. Validation checks identify data entry issues in MSRS and administrative functions similar to those established for CARS, which facilitates the project team to monitor data collection.

We used unique child identification numbers (ID) to link data in CARS and MSRS. The child's name (i.e., first name and last initial) is used as a secondary validation measure to ensure the accuracy of record matching, the value of which we confirmed from the pilot test. We then generated scrambled IDs using child-level information from the sponsoring organization to preload child names to the provider's account. The provider could see each child's first name and last name initial in their MSRS account to report meal-serving time.

[7] MSRS and CARS web services are encrypted with SSL by default. MSRS and CARS also use auth-token based authentication per provider. All content stored for MSRS and CARS is also encrypted at rest within SQL server.

[8] We built the system with enough internal validity checks to identify and resolve errors as close to real time as possible, so we have a self-cleaning dataset produced by both MSRS and CARS. We would have conducted additional data cleaning but would not have had the resources to do any type of additional contacts with providers or parents to resolve these issues. We would rely on our logic checks for resolving these cases. We will solicit information from sponsors and other resources to develop a full-fledged list of these logic checks.

Both CARS and MSRS use unique IDs for child, parent, and provider to link records, so no identifiable information about children at FDCHs is transported over the internet. This ensures that confidentiality is maintained.

Data collected from MSRS and CARS are stored in a central database that records the day/time when the users submit data and when the data are saved into the database. Both the web-based application and the SQL server database are hosted on Amazon's EC2 cloud servers.

2.3 Pilot Test[9]

To test and finalize the instrument, we conducted cognitive interviews in Virginia and a month-long pilot test in Texas in September 2015. During cognitive testing, providers and parents reviewed screenshots of MSRS and CARS and provided their interpretations of instrument design. Based on this feedback, MSG revised MSRS and CARS for the pilot test. During the pilot test month, providers and parents were given access to MSRS and CARS and used the technology for an entire month. MSG monitored their use daily and followed up with non-respondents as necessary.

The pilot test demonstrated that MSRS and CARS are effective tools to collect information from providers and parents in a timely manner. During the pilot test month, MSG observed a 95 percent response rate from providers using MSRS and a 100 percent response rate from parents using CARS. Providers and parents reported that the burden of using the technologies was minimal. Providers used MSRS primarily through smartphones, with limited use of the web-based alternative. Some providers preferred reporting in real time; others preferred reporting all meals at the end of the day. Parents showed a strong preference for text messaging through their mobile phones and reported attendance drop-off and pick-up times mostly within five hours of the actual event.

After the pilot test, we conducted exit interviews with participants to understand their experience using the data collection instruments. Based on user feedback and an examination of the data, we made further improvements to MSRS and CARS to finalize the development of CARS and MSRS.

[9] More detail is available in the Pilot Test Memorandum MSG submitted in 2016.

3. Feasibility Test

After the pilot test in 2015 (as described above), we finalized the data collection instruments and applied for the Office of Management and Budget (OMB) clearance for a scaled-up field test. In April 2017, we obtained approval to conduct a field test to implement MSRS and CARS in two States, which is the main task of the feasibility study. In this section, we discuss the recruitment of study participants and the implementation of MSRS and CARS[10].

3.1 Sample Design

The goal of the study was to establish the internal validity of the proposed approach, not to generate nationally representative statistics of improperly claimed meals. Thus, our sample design serves two purposes:

- to reflect the CACFP administrative structure; and
- to ensure sufficient analytic power to detect improper meal claims at the lowest cost possible.

For the feasibility study, we used a purposive sampling approach to identify States, sponsors, and FDCHs. An important consideration was the need to recruit a sufficient number of participating entities at each sampling level to ensure that the feasibility study could provide robust analytical findings. We conducted a power analysis to determine the needed sample size. Power refers to the probability (80 percent or 0.80 is a conventional level) at which we correctly reject the null hypothesis, which states that the treatment effect size is smaller than 0.35 standard deviations. We specified this moderate effect size based on a social science research convention.[11] Using Optimal Design, a software program for advanced sample design,[12] we conducted a power analysis to determine the number of providers needed to detect a group difference of 0.35 standard deviation.

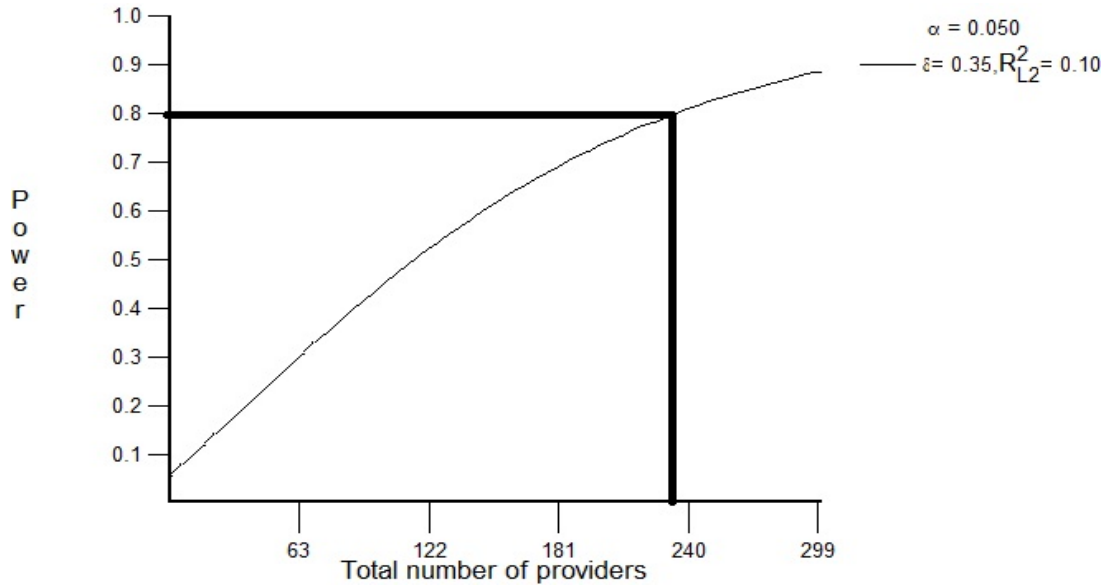
We assumed a conventional type I error, α=0.05; a minimum detectable effect size δ=0.35; and the proportion of the variance explained by the DD model, R squared=0.10. To achieve a power at or above the conventional level of 0.80, the analysis suggested that it is necessary to have approximately 230 providers. Exhibit 4 shows the results: the horizontal line for 0.80 power (y-axis) intersects with vertical lines for approximately 230 or more providers (x-axis).

[10] MSG also trained data collectors for the feasibility test. Detail of the training is available in the Memorandum on Data Collector Training submitted to FNS in December 2017.

[11] The effect size in this analysis may be measured with β coefficient (standardized b coefficient) associated with the treatment status, D, in the regression analysis. It indicates the magnitude of the bi-serial correlation between the dichotomous treatment status and the continuous measure of meal claims. We refined the effect size definition, in the course of the study, as the group difference in between-period difference (DD) in meal claims (see Section 4.8).

[12] Reviewed from https://sites.google.com/site/optimaldesignsoftware/home in November 2018.

Exhibit 4. ***Statistic Power as a Function of Number of Providers***



3.2 Recruitment for the Feasibility Study[13]

Since there is no national or regional database for CACFP that can provide detailed administrative information on sponsors and FDCHs/providers, we asked States to provide a list of sponsors and sponsors to provide a list FDCHs for sampling purposes. This approach reflected the administrative structure of CACFP and facilitated communication across agencies for recruitment. The study recruitment process includes three milestone activities: (1) issuing formal notification and invitation of sampled entities to the study; (2) obtaining data files needed for each phase of sampling; and (3) receiving the administrative data needed during the study's data collection period. Below we describe the execution of recruitment activities at the State, sponsor, provider, and parent level.

Contacting regional offices and States. We recommended four States—Minnesota, Texas, Virginia, and California—to obtain the cooperation of two. We selected these four States based on daily attendance in 2016, the amount of reimbursement payments in 2016, and geographical location. Two of the States are relatively small, with each serving less than three percent of the national total of children attending day care homes and receiving less than $60 million in Federal reimbursements. The two larger States each serve more than 12 percent of children attending day care homes and receive more than $300 million in reimbursements. The four States are in four different FNS Regional Offices (FNSROs): Midwest, Southwest, Mid-Atlantic, and West. Minnesota turned down the invitation; Texas and Virginia agreed to participate in the study. We did not contact California.

Sponsor recruitment. Using demographic and location information provided by the State agency, MSG categorized sponsors by geographic region of the State, by rural and urban areas served, and by size (e.g., number of FDCHs). We first sent an invitation letter by email to the

[13] More detail is available in a summary report on recruitment MSG submitted in February 2018.

sponsor contact person in both States. We then prepared a memorandum of understanding (MOU) for sponsors and offered two webinars to further onboard sponsors after we emailed study invitations to them. During the webinar, we explained the purpose of the study, the study approach, and the expected levels of effort for sponsors and providers. Ten sponsors, four from Virginia and six from Texas, agreed to participate in the study.

Provider recruitment. With information sponsors submitted about providers, we began sampling providers and requesting their participation. We developed an algorithm to randomly select up to 35 providers[14] from each sponsor that included providers with different enrollment sizes in both urban and rural areas across the State. Next, we randomly assigned selected providers to either the study or the control group. We then emailed providers in the treatment group to inform them of the study and invite them to participate. We sent reminder emails to providers if they did not open or did not respond to the initial email. We also made personal phone calls and sent text messages to providers who could not be reached by email. Once providers consented to the study, we requested parent contact information for parent recruitment.

Parent recruitment. We sent parents a text message about the study once we received their contact information from the providers. Text messaging was the most viable means to recruit parents because they would later use it to report child attendance. We asked FDCH providers to inform parents about the study. Through the text messaging system, we offered parents the option to ask questions about the study via phone or email.

3.3 Study Sample

We summarize in this section the recruitment results, including the number of entities that agreed to participate in the study and the characteristics of the final sample. Participants in the feasibility study did not participate in the pilot study as described in Section 2.3.

3.3.1 Sponsors

In Virginia, four sponsors from a good cross-section of the State joined the study. The other three sponsors we contacted turned down the study because they had a conflict in adopting a new electronic system for meal claiming during the proposed study month. Adopting two new technologies at the same time would have created stress for busy day care providers. It might also negatively affect the quality of data for this study. Two of the Virginia sponsors also expressed concern about privacy but ultimately were excused because of the conflicting timing of our study and their adoption of a new electronic meal-claiming system.

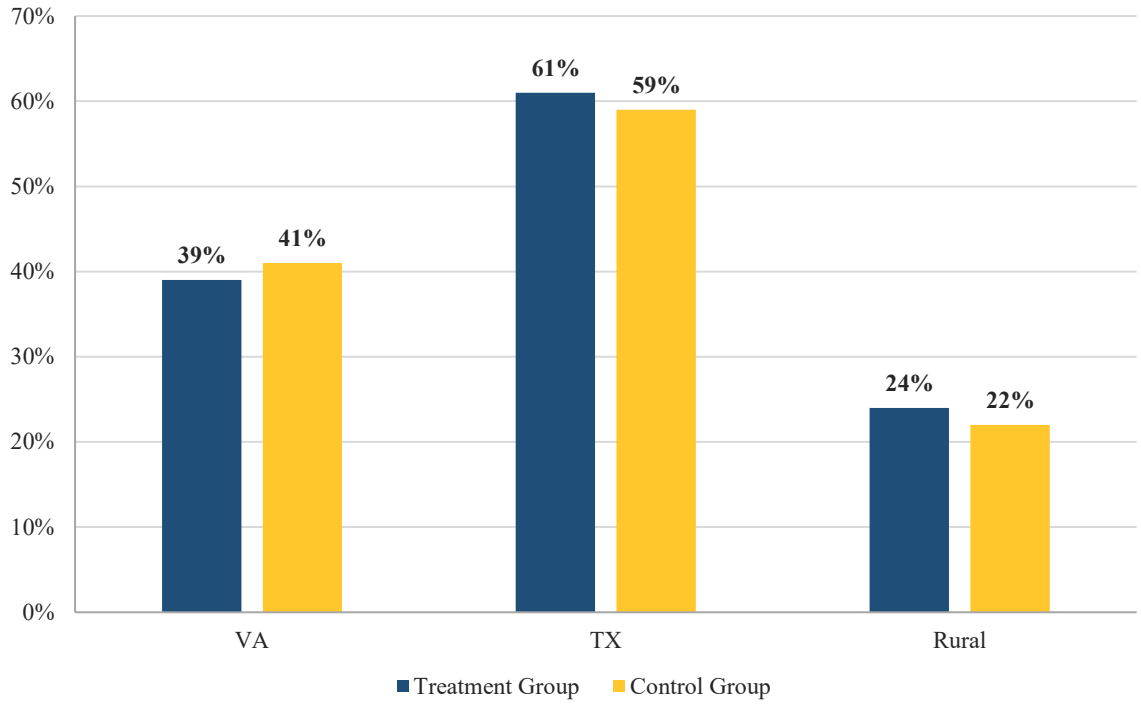
In Texas, four of 10 sponsors we contacted declined to participate; their reasons for declining varied. One sponsor was a very small agency with a small population of FDCH providers who were primarily older women and challenged by new technologies. One large sponsor declined because it was already involved in a multiyear CACFP study. Another sponsor started the process of joining and then stopped responding to our outreach.

[14] To ensure at least 230 providers in the final study (see Section 4.1), we oversampled providers to cope with potential issues of nonparticipation or nonresponse of the selected providers.

3.3.2 Providers

Participating sponsors in the two States provided enrollment data for 363 providers—219 in Texas and 144 in Virginia (see Exhibit 5). These data served as the sampling frame for the study. We randomly selected 189 potential treatment group providers and 174 control group providers. Based on the provider ZIP code, we appended the rural/urban classification code as provided by USDA's Economic Research Service.[15] The treatment group's mean enrollment (12.5) was similar to that of the control group (12.0), a difference that was not statistically significant. About 61 percent of the FDCHs in the treatment group are in Texas, and 24 percent of all treatment FDCHs are located in rural areas.

Exhibit 5. ***Allocation of Providers in Treatment and Control Groups***



Of the 189 randomly selected providers for the treatment group, we eliminated 47 for the following reasons:

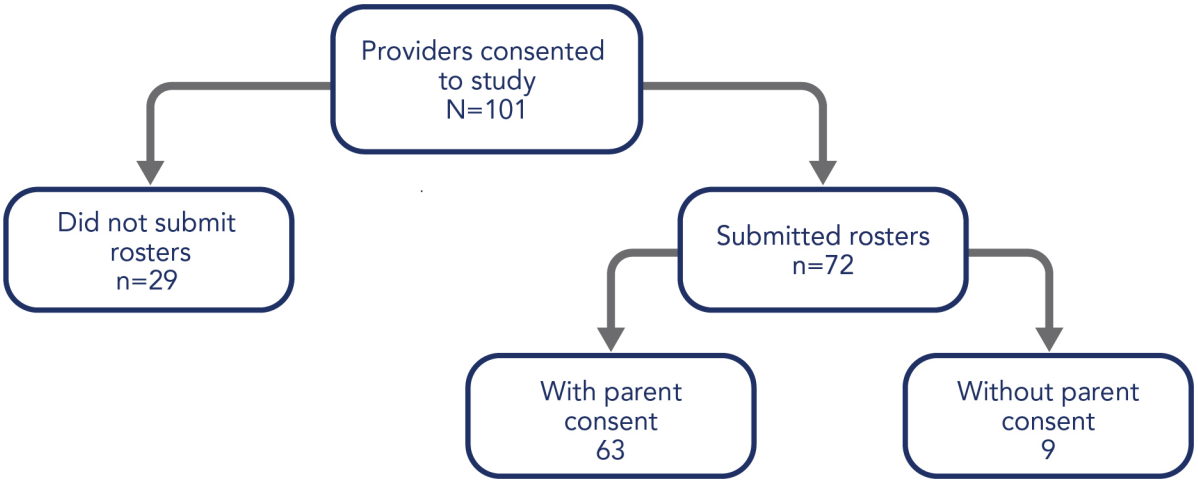
- No email
- No computer
- No longer providing day care
- Temporarily closed (five in Texas due to Hurricane Harvey).

The remaining 142 were eligible for inclusion in the treatment group, and we contacted them for participation.

[15] The rural-urban commuting area code classifies U.S. Census tracts as urban or rural using measures of population density, urbanization, and daily commuting based on data from the decennial census and the American Community Survey.

Of the 142 providers we contacted, 101 agreed to participate. Of those, 72 providers (51 percent) supplied child roster data. Nine of the 72 providers had no parents consenting to the study; from the remaining 63 providers, we collected meal serving data that could be validated with child attendance reported by at least one parent. Exhibit 6 shows the number of providers who agreed to participate and submitted requested roster information, as well as the number of parents who consented. Only providers who submitted rosters and had at least one consenting parent could participate.

Exhibit 6. ***Provider Sample***



3.3.3 Children

Once the provider agreed to participate, we obtained rosters of the children and their parents. These rosters contained fewer children than the enrollment data indicated. While the mean number of children cared for by the 72 providers who agreed to participate was 12.0, the rosters showed a mean of 8.1 because some students were enrolled but were no longer in attendance or were not receiving meals. This difference substantially impacted the number of children available for the study. Instead of 864 children for which providers could theoretically provide data, according to the rosters, 580 children remained with the possibility of some CARS data collection.

We solicited the participation of parents of all children cared for by the 72 providers to report drop-off and pick-up data using CARS. We provided an incentive to encourage participation. Parents representing 216 children agreed to participate, a participation rate of 37 percent based on the student rosters.

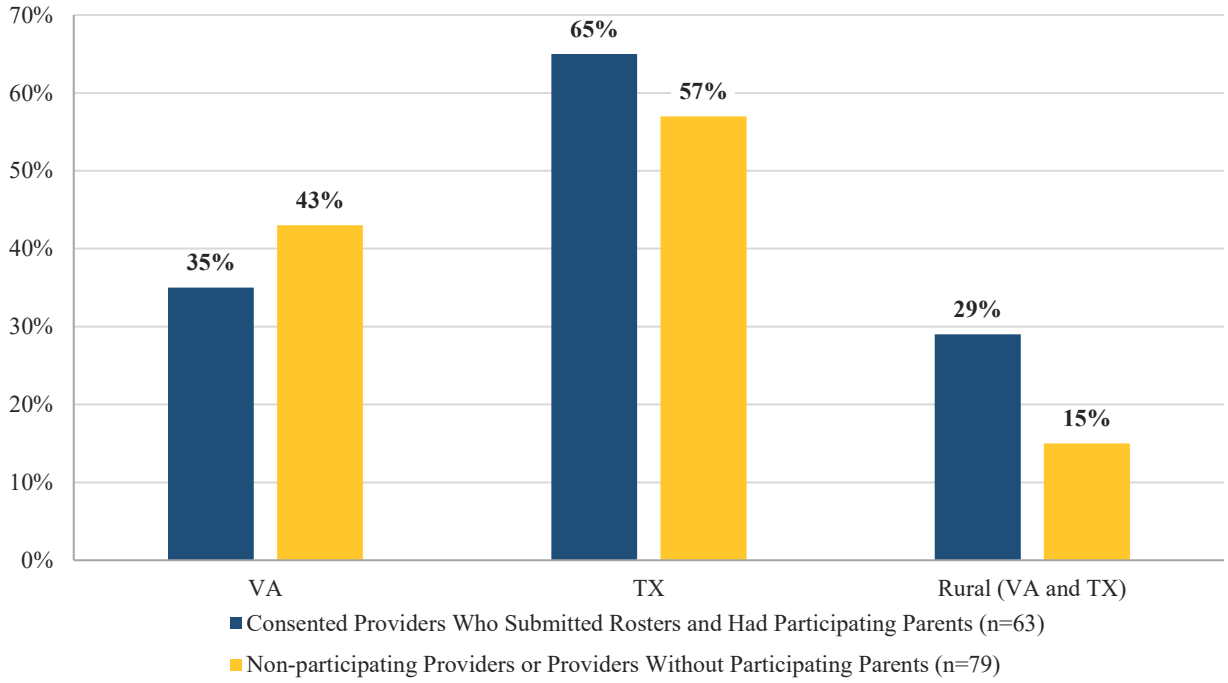
3.3.4 Providers with Participating Parents

Sixty-three providers submitted rosters and had at least one participating parent. Of these 63 providers, the parental participation rate was 40 percent. Only five small providers had 100 percent of their parents participating. The median participation rate among parents was 38 percent.

These 63 providers cared for 538 children and had a mean enrollment of 12.8 children, which is slightly higher than the 12.3 mean enrollment of the 142 providers that did not agree to participate, did not submit rosters, or had no participating parents.

Further examination of differences between the groups indicates that the providers with participating parents skewed toward rural areas and Texas (Exhibit 7), with the chi-squared test of the difference in rural percentage statistically significant ($p < 0.05$). The difference between States, however, was not statistically significant.

Exhibit 7. ***Allocation of Providers with and Without Participating Parents***



3.3.5 Lessons Learned from Recruitment

During the study month, the MSG team learned many lessons that have direct implications for any future efforts to undertake a meal claims study at CACFP FDCHs, either on a similar scale or a larger scale.

Voluntary or Required Participation. To the extent possible, requiring participation in the study may help in achieving a robust level of participation among those sampled for the study. However, to the extent that sponsors and providers already have full-time program responsibilities, an additional one might be challenging for them to accommodate, even temporarily. Sponsors and providers asked whether participation was required. Initial efforts to recruit sponsors were challenging, as sponsor recruitment occurred before FNS decided that participation was required.

While FNS agreed that we could state that provider participation was required, there were no consequences associated with the requirement. Still, many FDCH providers would not join the study. The $60 incentive for providers was helpful but not large enough on its own to entice providers to participate. We had originally suggested a $100 incentive but reduced it to $60 in

keeping with OMB's preference at the time for a strong justification for incentives based on actual participation costs.

Despite required participation for providers, 31 of the 142 providers we contacted still chose not to participate. Some indicated they were willing to accept any consequences associated with their decision; however, there were no stated consequences.

We offered parents a $25 incentive to participate, based on mobile phone charges they might incur; we had initially proposed a $50 incentive for parents, which might well have increased participation rates.

Who Sends Recruitment Invitations. It is helpful if the recruiter is familiar with the sponsoring organizations and providers as was the case with our lead recruiter for Texas. In the future, it is worth considering asking State agencies to recruit sponsors, and sponsors to recruit the providers, and providers to contact the parents. This approach would save time and effort in getting the invitation noticed and getting each entity to respond. In this field test, the most successful and least time-consuming recruitment for FDCHs was with sponsors who were proactive in their engagement with CACFP and supported the study recruitment efforts. When the sponsor held back or did not fully support the study, it was much more difficult to recruit providers. Similarly, when the FDCHs contacted the parents of children in their care to let them know about the study, we saw more parents joining, presumably, to help their provider.

Organizational Capacity of Sponsors. *S*ome sponsors had difficulty with the secure file-sharing options (needed for provider lists and child enrollment forms) or even password-protecting documents. This required patience and staff support to explain the process. It is essential to provide sufficient time to work with sponsors, as their staff members have day-to-day internal organizational demands that may take priority in their schedules.

Working with FDCH Providers. FDCH providers may have varying levels of familiarity and comfort with the skill sets needed to use MSRS. Older providers, in particular, may be challenged by technology. Providers in rural areas (especially in a large State with vast rural areas, such as Texas) cannot be counted on to have consistent, reliable connections to the Internet or cellular service, although this is likely to improve with the implementation of 5G, the fifth generation of cellular network technology.

Understanding the day-to-day operations of the CACFP helps with the timing of communications at all levels as well as the strategies used. It was extremely beneficial that our recruitment staff included those who understood the program. This helped build rapport and keep participants invested in the study.

Study Communications. It helped to use multiple platforms to reach providers (i.e., email, text, social media, video) and share information with them in multiple languages (i.e., English, Spanish). While we did not create a website for the study, doing so might be useful in keeping all the pertinent information in one area for participants to refer back to in case an email or text message is deleted. We created an invitation-only Facebook page, which had some of the same benefits.

Timing of Recruitment and Gaining Familiarity with Study Tools. It is critical to plan sufficient time for recruitment and give study participants time to become familiar with the data reporting tools. We did not have providers or parents use the reporting tools in advance of the

study month to minimize behavioral changes in the pre-study month. However, it would have been beneficial to release the tools a few days earlier before the study month.

3.4 Data and Data Sources

The design of this study required data from three primary sources: (1) meal-serving records provided by FDCHs via MSRS, (2) daily child attendance records provided by parents via CARS, and (3) administrative data and meal claims provided by sponsor.

3.4.1 Meal-Serving Time and Meal Claims

We collected meal-related data from providers using MSRS and from sponsors who uploaded claims. Providers used MSRS to record times for all served meals in the study month, November 2017. We then collected edited meal claims reimbursed from sponsors for the pre-study months, September and October 2017, and the study month to estimate IP. These meal claim records were disaggregated by child and meal type to determine specific kinds of errors. We used meal claims that sponsors edited and submitted for reimbursement.

3.4.2 Child Attendance

Using child enrollment forms obtained from Sponsors and providers, we confirmed each child's name and enrollment status and asked parents to participate in the study for one month. Specifically, we asked parents to report daily arrival and departure times for their child(ren), including instances of multiple pick-up and drop-off times. For instance, a child might be dropped off at the day care in the morning, be picked up by a parent for a doctor appointment, and then return to the day care home for continued care. Parents also reported absence and daycare closure. This parental daily attendance record, in combination with provider-reported meal service times, provided a proxy of possible meal serving times for a child.

3.4.3 Provider/Sponsor Administrative Data

The final set of data that we collected during the feasibility study consisted of administrative data from both sponsors and providers. The main administrative records of interest for the study come from two primary sources: the sponsor-provider agreement and the child enrollment form.

The sponsor-provider agreement documented the approved meal service pattern the provider could offer, hours of operation, hours of meal service for each meal, and meals for which the provider was approved to receive reimbursement. Additionally, it provided the tiering status of the home, in some cases, information on the licensed capacity of the home or the maximum number of children that could be in attendance at one time. The child enrollment form was essential for this feasibility study. It served as an additional source of validation for the improper meal claims analysis. The child enrollment form contained the date from which the child's enrollment was valid, the days of the week the child was enrolled, the meals the child was eligible to receive, and the times the child was expected to be present in care each day. The form included the tiering status of the provider and, if not Tier I (based on provider geographic location or provider income eligibility), eligibility of the child based on household income. Tiering or household eligibility is needed to determine the reimbursement rate and the financial impact of any IP. The child enrollment form was also a main data source for contacting parents. It was used separately in the study for sampling and study recruitment purposes.

The sponsor-provider agreement, supporting licensing and capacity information, and the child enrollment form are typically paper forms or Excel spreadsheets. Sponsors provided these data for the sampled FDCHs. Since the data might not be in an electronic format (or a standardized one), the MSG team developed a standardized template for entering and abstracting this information to create the analytical dataset.

Collectively, we used the administrative data to define allowable meals for a child and to validate the edited meal claims in the study month. (This process is described in further detail in Section 4, Data Processing).

3.5 Data Collection

In this section, we describe the implementation of MSRS and CARS in the study month, November 2017, including preparation prior to the study month, the launching of the study month, monitoring data reporting, parent follow-up, closing the study month, and data collection from sponsors after the study month. For each stage, we discuss issues we encountered and the solutions we implemented to address these issues. We also share lessons learned and afterthoughts that may inform the design of national implementation.

3.5.1 Distributing Materials and Information Prior to the Study Month

We recruited providers for the study month, November 2017. Prior to the study month, we emailed providers a link to install the MSRS application on mobile devices along with their account access information (username and account PIN).

The timing on when to distribute MSRS was challenging because the providers varied in the time and frequency with which they check email and their familiarity with technology. We decided to send the information at 5:00AM on Monday, October 30, 2017, two days prior to the start of the study month, to allow time for providers to install the app and access their accounts while keeping the use of MSRS in October to a minimum, as we also used October as a pre-study month to compare the meal reporting patterns with the study month.

We contacted providers by phone on October 30th, the same day the MSRS login information was delivered to the providers to make sure they received the email. We also posted an announcement about the email on the study's Facebook page and called all the providers on October 30th and 31st. If we were unable to speak to a provider directly over the phone, we left a voice message on the phone or emailed and made at least three phone attempts to reach them.

Providers requested technical assistance through email and phone. Of 38 provider technical assistance requests during the study month, 15 concerned child enrollment (child missing or name entry issue), 14 needed the link to download the app resent, 5 had installation problems, and four needed to correct a reporting error they made.

For providers who consented but could not be reached to confirm their access to MSRS, we continued daily follow-up until November 10th, a week and a half after the beginning of the study month. We assumed providers had dropped out of the study if we could not reach them and did not receive any reporting from them at that time.

Parents received an invitation text message to the study on October 24, 2017, and some started responding on the same day. We started engaging with parents a week prior to the study month to

ensure their consent and allow enough time for them to ask questions and get used to the daily reporting of drop-off and pick-up times.

We used text messaging to communicate with parents about the study, including links to the consent documents and instructions to use CARS. Some parents did not receive the initial text after consenting. All parent communications were in both English and Spanish. The Spanish translation seemed necessary as some parents did not respond unless we sent the Spanish translation.

We sent the following reminder text message to all consenting parents on October 31st, one day prior to the beginning of the study month:

> *Hello CACFP meal claims study parent! Start using CARS tomorrow, Nov. 1, to report child attendance (Here's how: http://bit.ly/CARS_User). If you prefer to use CARS website, visit http://cars.manhattanstrategy.com/ and log in: Username = your cell phone number; Password = SRAC*
>
> *¡Hola padre del estudio CACFP! Comience a usar CARS mañana, 1 de noviembre, para informar sobre la asistencia de su hijo (haga clic aquí para ver cómo: http://bit.ly/CARS_ESP). Si prefiere usar el sitio web de CARS, visite http://cars.manhattanstrategy.com/ e inicie sesión: Nombre de usuario = su número de teléfono celular; Contraseña = SRAC*

A few parents expressed interest in joining the study after the study month had started. We included all parents and their children in the participant list for CARS and MSRS if they informed us of their interest by November 3rd.

3.5.2 Launching the Study Month

We monitored responses from providers and parents on a daily basis and followed up with the ones whose responses were missing from the previous day. The follow-up required multiple efforts by phone, email, and/or text to reach the provider or parent. It was particularly intensive in the initial days of the study month. Below we summarize the challenges for collecting responses from providers and parents, respectively.

Providers. Unless there are two caregivers in the home (or time of day when the provider has some help), the provider is unable to take time away from the children to respond to the treatment group. We found specific time windows during the day to be most favorable for contacting providers. These time windows often coincided with children's nap time in the early afternoon and time when day cares were closing in the early evening. It was challenging to contact all providers during these time windows, especially in the early days of the study month. In some cases, we left multiple voicemails before reaching the provider.

In our outreach efforts to obtain meal serving times, we prioritized providers who, if reached, would maximize the data reported. For example, if a provider missed reporting on November 1 and we did not reach her on November 2nd, we prioritized this provider for a follow-up call on November 3rd if she/he did not report meal service on November 2nd as well. As the study month continued, we prioritized to follow up with providers who had more frequent reporting to minimize missing data from these providers. The data collection team kept an active log to

document providers with whom they had spoken, issues discussed, and solutions or follow-up actions if needed. Providers reported the following issues:

- Some providers entered incorrect meal serving times and did not know how to correct them. Providers could change their time reporting on the same day, but not retroactively. The user manual and training video instructed providers on how to do so. The study team walked through the steps with these providers to make sure they could edit meal times if needed. Providers who needed to report for a previous day or change reporting on previous days had to call the study hotline or email the study team to obtain assistance.
- Providers reported the burden of the study on their routine, mostly in the beginning of the study month, as they needed to report the same information twice, once to their sponsors for reimbursement and once to the study team.
- Providers rarely used the "Summary and Submit as Final" function despite email reminders to use this function to confirm daily entry. We emailed the providers to emphasize the importance of using this function, but few used the function.
- Many providers were not savvy with mobile apps, even though they had access to smartphones. Some also lacked fast and steady internet access. In Texas, one-third of the providers were unable or unwilling to report using MSRS. Of the other two-thirds, most, if not all, needed to be contacted at least once (and most more than that) to fill in missing data. About one-third of the Texas providers were manual claimers with their sponsors, but these providers were not always the same providers and were unable or unwilling to submit data electronically to the treatment group. We spot-checked and called providers to address any problems with submissions.

In addition, when we reached out to a provider who had some reporting challenges, we occasionally reached someone who needed assistance in Spanish. We had a Spanish speaker on the study team follow up with these providers to help them access and use MSRS as intended.

Parents. Just as for providers, we followed up with parents daily if they did not report drop-off and/or pick-up times for the previous business day. CARS automatically sent parents two reminders on their mobile phones if they had not reported drop-off time or absence by 10:00AM and pick-up time by 7:00PM. In the actual study or field test, we received 3,282 entries in CARS, which is 72.7 percent of entries we expected to receive based on the number of children, their attendance pattern, and the occasional multiple daily drop-offs and pick-ups reported by parents. Thirteen parents did not send any information in CARS though they consented to the study. This response pattern was in contrast to that of the pilot test during which all participating parents used CARS daily to report. This suggests that the difference in data quality may have been due to the stronger rapport with parents developed during the pilot test recruitment and the offer of a more attractive incentive.

Additionally, a technical bug caused CARS to send multiple reminders to parents on November 7, 2018, which may have caused confusion among parents in the field test. We stopped the reminder function on CARS temporarily and sent reminders via our back-up text messaging system while the MSG IT team fixed the CARS reminder function. On November 10th, the CARS reminder was repaired and working as intended.

During the pilot test, parents expressed in interviews a willingness to participate as a service to their providers, and providers encouraged parents to participate. The overall setting of the pilot

test was more personal; the pilot participants had also agreed to take part in a cognitive interview about their participation, so they were more motivated to work with us. It was challenging to instill the same sentiment during the field test due to its larger scale. Moreover, the goal of the pilot study was to develop an instrument while the field test was to test the instrument to identify errors. With reduced incentives, providers were less likely to encourage parents to participate as a favor to the providers themselves.

During the field test, the amount of time available for onboarding parents was shorter than for the pilot test because we needed to use pre-study month data as a baseline and chose to minimize the interruption of the business routine at day cares; this may have affected the results. The shorter onboarding window likely contributed to fewer responses during the first week of the field test. There were also uncontrollable external factors that affected participants in Texas, including the aftereffects of Hurricane Harvey and the Sutherland Springs church shooting on November 5th. These events directly impacted providers, causing some to close their doors for part of the field test period.

CARS required parents to strictly follow the text format to process the message. The user manual specified the accepted formats and scenarios for multiple children and multiple drop-off; however, it still took parents some trial and error to send their messages successfully. In another example, the parents' phone number had to be in the CARS data system to enable them to text CARS. If a parent texted CARS from a number different from the one we had obtained from the provider, CARS was not able to process the message from that parent. In some of these cases, parents had not yet consented to the study but thought they had. As their phone numbers were not in the CARS database, they received error messages. When parents received error messages, they sometimes gave up on trying a second time or did not contact the study team to troubleshoot. The problem was solved once we reached out to them.

Additional channels of communication, besides parents' cell phone numbers, could help improve response rates. In some instances, we were never able to connect with parents, leaving voice messages each time we called. In other cases, the phone number was no longer in service. Having their email addresses to send data requests or inviting them to join a Facebook group, as we did with providers, might improve future response rates.

In summary, the most significant challenge with parents was to obtain consent from them, as their participation was voluntary. Compensation level differences might have impacted the parent response rate. The parents received $50 as an incentive during the pilot test, which was reduced to $25 during the field test, as previously noted. The multiple reminders parents received on November 7th could have turned off some parents. However, it seems unlikely as the response rate on November 8th was higher than on any of the previous days since the study month started.

3.5.3 Monitoring Data Reporting

The data collection team relied on the monitoring dashboard the IT team created to keep track of daily reporting from providers and parents. Data collectors recorded follow-up actions in SmartSheets (software as a service application well suited for dashboard management), one for providers and one for parents.

The monitoring dashboard is a built-in function of the MSRS system. It automatically logs information providers entered to their accounts, along with metadata, such as the time of data

entry and reporting methods (mobile device or MSRS website). The data collection team used the dashboard to identify providers and parents who had not reported information on the previous day so they could follow up.

The biggest challenge of the dashboard during the study month was the time difference between the server location and the time zone the providers and parents were in, which we did not anticipate. As a result, data from providers could show up on the wrong date in MSRS and on reports. This made it challenging for the study team to determine if a provider needed to be contacted for data collection. As an alternative, the IT team sent data received from providers and parents on the previous day to the data collection team every morning at about 9:00AM. The data collection team then examined the data to identify non-respondents, missing data, or other data reporting issues before following up with providers and parents.

Unexpectedly, as the study month progressed, rapport grew between the MSG study team and the providers. This happened mainly with the providers who needed to be contacted frequently to update their data, but not exclusively. Phone calls with the providers became more sociable and conversational. Once we established connections with providers, their reporting became more frequent, and follow-ups became easier.

3.5.4 Parent Follow-up

Using the monitoring dashboard, we compiled a list of parents who needed to be followed up each day. Parents receiving follow-ups were those who had not reported the previous day's drop-off and pick-up times, those who contacted the helpline after hours, and those who had yet to respond to any attempts at contact. The study team used cell phone numbers on record to connect with parents. To minimize disturbance to parents and maximize the chance to reach them, we made follow-up calls during lunch hours (12:00–1:30PM) and towards the end of the work day (4:00–6:00PM). We left voice messages if we could not reach parents directly, detailing the reason for the call and the information requested from parents. Once we spoke to a parent, we collected the missing drop-off and/or pick-up information on the phone so we could manually enter it into the database. We also requested parent email addresses if we needed to send or collect further information to address technical issues.

Some parents forgot to report child attendance information despite the two daily reminders. For some parents, CARS reporting became part of their daily routine after one or two days of reporting. For others, it took longer to get used to the specific text format that CARS required.

While providing high-quality data, this data collection process was labor-intensive. If the process were replicated for large-scale study, the data collection team would need to be expanded to handle the amount of work in a relatively short but intensive time period. Additionally, it could be helpful to build more flexible text formats so that parents would not be discouraged by frequent error messages. For parents who appreciate self-monitoring, it could be beneficial to build a data-tracking feature into the app that records the number of times a parent successfully enters the data so they can see their daily success.

3.5.5 Closing the Study Month

On the day after the study month ended, we sent an email to providers and parents thanking them for their participation in the study, which concluded on November 30, 2017. We also indicated

that we might contact them about any recent missing data and that we would contact them soon about sending their gift cards by email.

In mid-December, we emailed the sponsors a thank you note to confirm the conclusion of the study month and remind them that we would be asking for additional data once the meal claims for the study month were final.

After the completion of the study month, the CACFP study team distributed incentives as Visa gift cards to participating providers ($60) and parents ($25). The study team used a third-party service—www.giftcards.com—to deliver the incentives via email. Compared with the incentive delivery method used during the pilot study—delivering physical gift cards by U.S. Postal Service certified mail—electronic delivery reduced mailing costs and increased delivery success.

Through the recruitment process and direct engagement with the providers prior to and during the study month, the study team was confident that the email addresses associated with participating providers were accurate. Yet, to be certain, that the providers' email addresses were still valid for the distribution of incentives after the study month ended, the study team used Constant Contact to send providers a verification email that (1) indicated incentives would arrive via email and (2) instructed providers to send a reply email to cacfp@manhattanstrategy.com that included the word "confirm" in the email body. By doing so, providers confirmed the validity of their email accounts and indicated that they understood how incentives would be delivered. To maximize the number of verified provider email accounts, the study team re-sent the verification email to non-respondents. The study team then input its list of confirmed provider email accounts into the www.giftcards.com user interface, provided payment, and executed delivery. The processes for delivering incentives to parents took place concurrently. We sent parents text messages to obtain email addresses, which we authenticated, and distributed incentives to their email address as with providers.

3.5.6 Collecting Data from Sponsors After the Study Month

Sponsors, who had no active role during the study month, were subsequently asked to submit data on actual reimbursed claims once available, several months later. We created a detailed document with instructions for creating the *MinuteMenu*[16] export reports that would contain all the data elements needed for the analysis.

We started collecting claims data from sponsors in February 2018. We emailed sponsors in January 2018 and followed up until April to collect information from all the sponsors. To assist sponsors in extracting data from their system, we drafted a step-by-step instruction for sponsors' use of the *MinuteMenu* software program. Most sponsors using *MinuteMenu* followed the instructions and sent us the requested data without questions. We also walked through the steps with sponsors over the phone to help them extract the requested data.

Sponsors followed the same steps to upload data to MSG's secure cloud-based data file-sharing system as they did during recruitment. We emailed sponsors a link and step-by-step instructions to upload data. Sponsors uploaded all requested data by the end of April 2018.

[16] *MinuteMenu* is widely used software system used by sponsors and providers to manage CACFP claims and reimbursements.

Some of the sponsors entered their FDCH meal claims data into *MinuteMenu* and were able to generate and upload the requested data quickly in a spreadsheet format. These data were easily transferred to our data processing system. Based on anecdotal reports, these sponsors may have had more providers who used the electronic claiming system, or they may have had staff to enter the data once the manual claims were received.

Some sponsors used *MinuteMenu* or another computer program to submit their claims to the State Agency but still had manual claim data for some providers. For these sponsors, we offered options to scan or take photos of the manual claim sheets, and our staff entered the data into our data system. We did not collect data on how many providers within each sponsoring agency used electronic versus manual claiming methods or the systems sponsors used for submitting their claims to the State Agency.

Some issues we encountered with creating the reports were solved by altering the instructions. These instructions were developed for the feasibility study, and updates were made based on sponsor feedback. For the sponsors with providers using manual claims, several weeks passed before we received the data because of the challenges they had with scanning and uploading the files. We ended up having photographs of the data sent to us instead of computer scans, which worked well.

We then scanned the photographs into our file-sharing system so the data collection team could follow up with sponsors quickly regarding any high-level questions, such as missing information. Some trailing issues emerged in the middle of data processing, and the data collection team followed up with sponsors on a case-by-case basis. For data, we entered manually from scanned images or photos, and used the meal summary to check the accuracy of daily data by meal type.

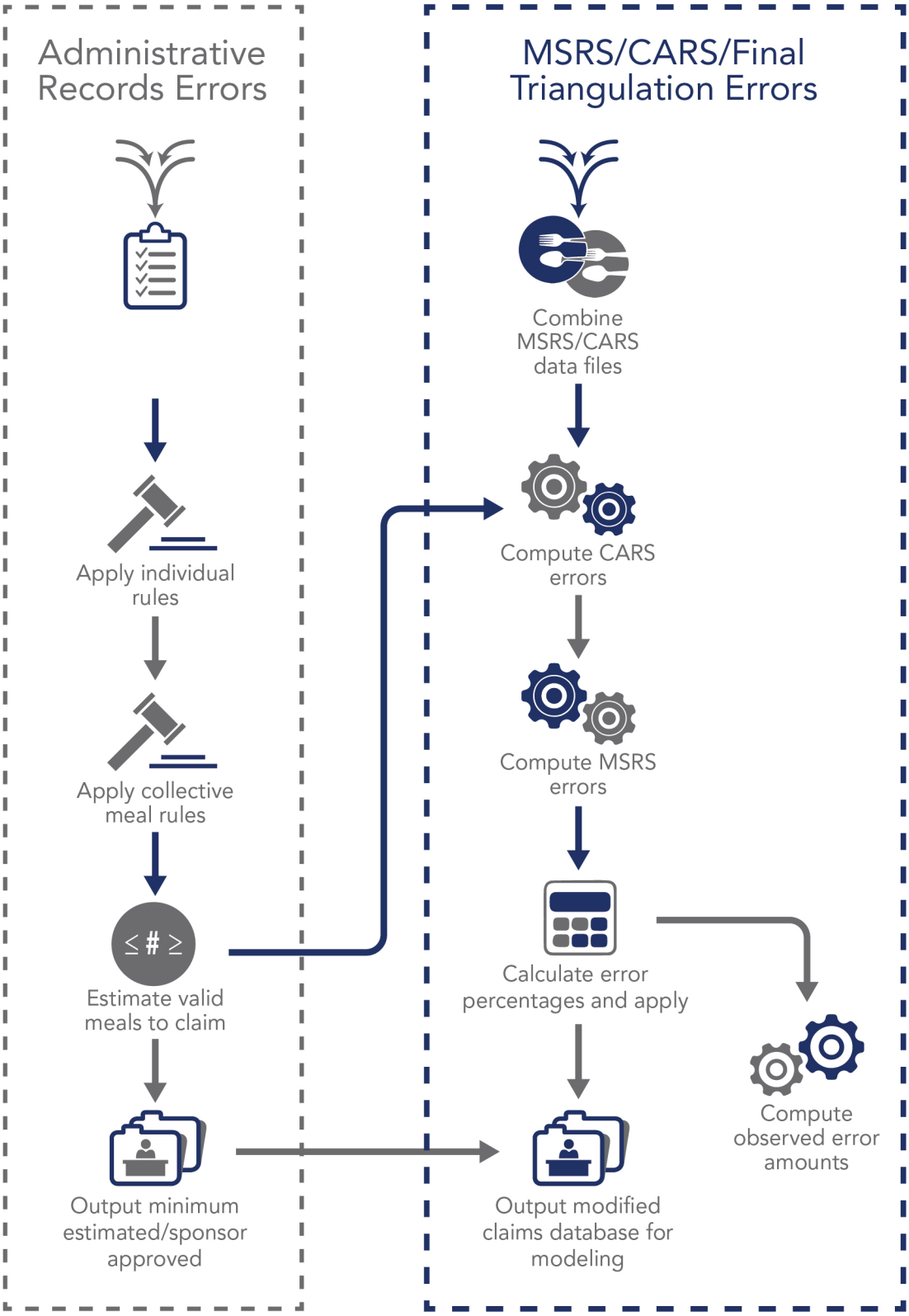
4. Data Processing

As previously stated, the feasibility study uses data from three principal sources: CARS, MSRS, and sponsors. Exhibit 8 shows all the data processing steps.

The left panel shows the steps we took to process the administrative data files from the sponsors. These steps are explained in detail in Section 4.1, Data from Sponsors. Sponsors provided four types of information: (1) provider-level meal counts by type, tier, and total reimbursement for the study and pre-study months; (2) meals providers in the treatment group submitted to sponsors for reimbursement in the study and pre-study months; (3) child information for the treatment group (e.g., child's birthdate, normal attendance patterns, enrollment status, relationship, tier, and participation to CACFP); and (4) study-group provider information (e.g., provider's eligible service days, open time, close time, standard serving times, license type, tier, and capacity).

The right panel in Exhibit 8 shows the steps to process the primary data collected from CARS and MSRS, detailed in Section 4.2, CARS, and Section 4.3, MSRS. Parents reported drop-off and pick-up times for their children in CARS. They also reported child absences and provider closures. Parents received a reminder to submit their information if it was unreported as of one hour after the expected drop-off or pick-up time. Providers used MSRS to report meal-serving times and the number of children who were present for each meal. Additionally, child absences and the providers' closure were submitted.

Exhibit 8. ***Overview of Data Processing Steps***



The following sections show the steps for processing data from each source, i.e., CARS, MSRS, and sponsors.

4.1 Data from Sponsors

Sponsors supplied four distinct types of administrative data, each with its own format: (1) child attendance data, (2) sponsor-edited provider-level meal claims, (3) child information, and (4) provider information. This section discusses each type and its processing.

Child Attendance Data. The most detailed data providers submitted to sponsors to show the meals for days on which the provider reported that the child was present. Sponsors sent data for all providers in the treatment group for the study and pre-study months. These data are the building block of claims submitted for provider reimbursement and are the processing focus. Most provider data stem from *MinuteMenu* system downloads to Excel workbooks. These workbooks are semi-structured; MSG developed a SAS program to read and format them. Fourteen providers submitted at least some of their data on paper copies only, which were faxed or emailed to MSG. This total includes one Virginia sponsor whose providers all submitted paper copies. A data entry specialist entered these into formatted Excel workbooks for use. Since the paper forms display children's names, some processing to standardize names was required.

Processing of sponsor-reported data occurred as follows, and Exhibit 9 shows summary statistics of meals in the child attendance data file.

- Read each *MinuteMenu* sponsor workbook (nine participating sponsors with three months of data) and converted the semi-structured data into structured data.
- Added each sponsor workbook to create a *MinuteMenu* master file.
- Read each manually entered workbook. No shift was assumed for these meals.
- Added each manually entered workbook to create a manual input master file.
- Added the manual input master file to the *MinuteMenu* master file to create a child attendance master file.
- Merged this master file with MSRS data to see if attendance records were missing for any MSRS children.[17]

Exhibit 9. ***Average Number of Meals Served by Providers in the Treatment Group***

Month	Meal Type	# of Providers	Mean	Standard Deviation	Min	Max
September 2017 (Pre-month 1)	Breakfast	68	103.1	47.3	1	222
	Lunch and Supper	68	119.5	62.8	0	346
	Snack	68	150.1	93.5	25	407
October 2017 (Pre-month 2)	Breakfast	68	117.3	54.4	20	257
	Lunch and Supper	68	132.9	65.8	0	318
	Snack	68	158.1	96.1	34	444

[17] Thirteen MSRS children did not have any attendance records and were dropped from further processing.

Month	Meal Type	# of Providers	Mean	Standard Deviation	Min	Max
November 2017 (Study month)	Breakfast	70	99.9	53.5	1	242
	Lunch and Supper	70	115.4	59.2	12	314
	Snack	70	139.6	85.5	29	430

Source: Attendance data collected from sponsors (provider N =70 [varied by month])

Sponsor-edited Provider-level Meal Claims. The meal claim data represent the most consolidated records of meal claims based on which providers received reimbursement. The meal claims in this data file are shown at the provider level, displaying the number of approved meals by meal type, tier, and the total approved payment in a month. Sponsors provided data for all providers in the treatment and comparison groups for the study and pre-study months. Sponsors in the study extracted data from *MinuteMenu* in Excel workbooks, with one workbook per sponsor.

MSG then merged the approved meal claim file with provider information we had collected and recorded previously at random assignment. The assignment information for FDCHs included enrollment size, language preference, and zip code. MSG appended Rural-Urban Commuting Area (RUCA) codes from USDA's Economic Research Service based on the zip code. These data are maintained in an Excel workbook with the treatment/control indicator.

Claims data processing consists of reading and appending the *MinuteMenu* Excel workbooks, reading the MSG provider workbook, and merging them. Exhibit 10 shows the summary statistics of information included in the claim file.

Exhibit 10. ***Average Attendance Days and Meals/Snacks Claimed by Providers***

	Meal Claim Month	Attendance/ Claimed Meal Type	# of Providers	Mean	Standard Deviation	Min	Max
Comparison	September 2017 (pre-study month 1)	# days	182	20.1	3.4	5	30
		Breakfast	182	99.5	75.1	0	356
		Lunch and supper	182	163.6	109.5	0	546
		Total snacks	182	163.7	108.2	5	786
	October 2017 (pre-study month 2)	# days	181	22	2.8	11	31
		Breakfast	181	110.3	81.2	0	465
		Lunch & supper	181	179.6	117	0	613
		Total snacks	181	177.9	107.9	18	638
	November 2017 (study month)	# days	180	20	3.1	8	30
		Breakfast	180	101.9	72.9	0	357
		Lunch & supper	180	167	107.7	0	563
		Total snacks	180	163.4	105	0	621
Treatment	September 2017 (pre-study month 1)	# days	63	19.9	2.3	15	30
		Breakfast	63	106.5	57.9	0	228
		Lunch & supper	63	131.1	84.4	2	489
		Total snack	63	140.9	68.3	25	328
	October 2017 (pre-study month 2)	# days	63	21.6	2.1	16	31
		Breakfast	63	118.4	61.4	0	260
		Lunch & supper	63	144.7	89.5	12	550
		Total snacks	63	154.6	69.5	37	320
	November 2017 (study month)	# days	63	19.2	2.6	14	29
		Breakfast	63	103.8	54.7	0	236
		Lunch & supper	63	126.1	74	12	454
		Total snacks	63	130.3	59.8	23	270

Note: The meal/snack statistics are combined numbers from all the different tiers.

Source: Claims information collected from sponsors at the provider level (provider N=244)

Child Information.[18] Sponsors provided child information Excel workbooks from *MinuteMenu for the treatment group at the child level, i.e., one row per child. For each child, the data* included birthdate, expected attendance patterns, enrollment status, relationship to the provider (e.g., provider's child), tier, and the status of CACFP participation, among others. Data used in this study were limited to relationship to provider, participation, and enrollment date for all providers; and tier status for the one provider with mixed tier claims. Data processing of the child information files consisted of reading the ten sponsor workbooks, appending them together, and joining them with the MSRS and CARS data by child ID.

[18] Note: sponsors supplied information on children from providers outside the treatment group also.

Provider Information.[19] MSG requested data for all treatment group providers. All participating sponsors extracted provider information from *MinuteMenu*. This data file contained many variables we used in the triangulation process for the treatment group. The workbooks were organized with one row per provider showing their eligible service days, opening time, closing time, standard meal serving times, license type, tier, and capacity. The files were processed by reading each of the ten sponsor workbooks, adding each to create a master file, and merging it with the MSRS data for triangulation use. Exhibit 11 shows the summary statistics of variables in the provider information data.

Exhibit 11. ***Allowed Meal Types, Meal Combinations Offered, and Tier Status for Providers in Control and Treatment Groups***

		Control (n=136)		Treatment (n=63)		Total (n=199)
Breakfast Allowed	No	32	23.53%	7	11.11%	39
	Yes	104	76.47%	56	88.89%	160
Lunch and Supper Allowed	None	27	19.85%	5	7.94%	32
	Lunch or supper	60	44.12%	36	57.14%	96
	Both	49	36.03%	22	34.92%	71
Snacks Allowed	0	27	19.85%	5	7.94%	32
	1	63	46.32%	32	50.79%	95
	2	33	24.26%	22	34.92%	55
	3	13	9.56%	4	6.35%	17
Meal Combination	Other combinations	71	52.21%	31	49.21%	102
	1 meal and 2+ snacks	3	2.21%	0	0.00%	3
	2+ meals and 1 snack	62	45.59%	32	50.79%	94
Tier Status	1	117	86.03%	55	87.30%	172
	2	14	10.29%	6	9.52%	20
	Mixed	5	3.68%	2	3.17%	7

Source: Provider information collected from sponsors (provider N =199)

4.2 Data from CARS

The CARS system output consists of one row per child per day, regardless of whether the activity is recorded. The CARS data include the drop-off time, pick-up time, absence indicator, closure indicator, various timestamps, and the actual text messages from parents. The CARS system parses out pick-up and drop-off time into different columns and records whether its source is from a text message or the CARS website.

The system generates daily Excel workbooks for the data collectors to contact parents who did not report child attendance time or status in the previous day. When data were collected via follow-up calls, the data collectors entered the child attendance information in the data file and indicated the data collection method as Manual Phone. Parents could also call an 800 number and leave a message or communicate through TextMagic, an SMS system we used as a backup to Twilio.

[19] Note: sponsors supplied information regarding providers outside the treatment group.

These were captured in additional workbooks and entered by the data collector with the method designated as either Phone Message or TextMagic.

CARS processing followed ten steps.

1. Read the CARS system output file.
2. Read and consolidate the non-system files. This includes the daily workbooks, phone message workbook, and TextMagic workbook.
3. Update the CARS system output file with the consolidated non-system files.
4. Output an Excel workbook with potential data that were incomplete or needed further processing. For example, some SMS messages were not in the format CARS could automatically process or included drop-off or pick-up status without a time.
5. Manually review these data in the Excel workbook.
6. Update the CARS data with the manually reviewed data for the first pick-up and drop-off for each child.
7. Append the records for any instances of second drop-offs and pick-ups.
8. Sum the number of times each child is dropped off and picked up with a valid time value.
9. Compute the mean drop-off and pick-up times of children at a day care.[20] We used the mean times for a given child to replace missing drop-off and pick-up times.
10. For non-holiday weekdays with missing information, substitute with the mean values generated in the previous step. Consider the record valid if the child is reported as absent, the day care reported as closed, or a drop-off and pick-up time exists. Output the final dataset.

Exhibit 12 shows that children attended participating day care homes for an average of 12 days in November 2017. The average attendance was about 11 days in Texas and 13 days in Virginia. The attendance of children in the five participating sponsors in Texas ranged from 10 to 14 days and in Virginia from six to 15 days. On average, children in the day care homes of the nine participating sponsors had approximately one absence and the homes closed for about one day in November 2017. The average attendance time of a child was about five hours and 14 minutes.

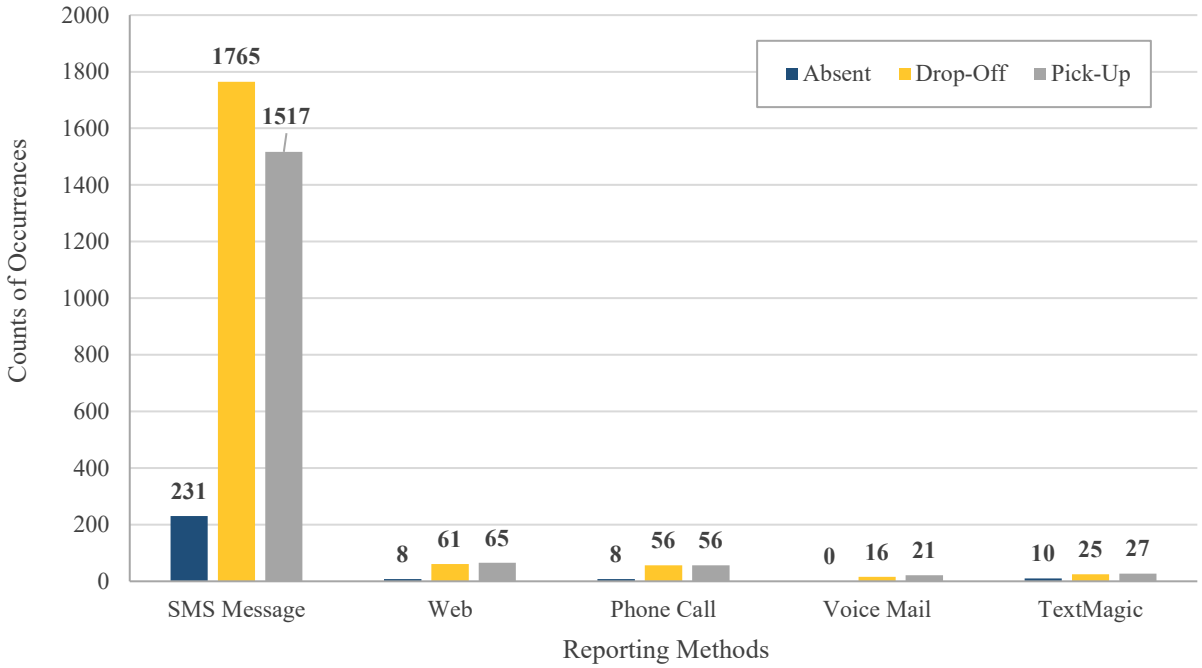
Exhibit 12. ***Child Attendance in the Study Month Reported in CARS (Child n=215)***

	Mean (Standard Deviation)			
Level	**Days Attended**	**Days Absent**	**Days Closed**	**Daily Attendance (hours:minutes)**
Total	12.0 (8.5)	1.2 (2.2)	1.2 (1.5)	5:14 (4:02)
State				
Texas	11.3 (8.5)	1.1 (1.9)	1.3 (1.7)	5:00 (4:13)
Virginia	13.3 (8.3)	1.4 (2.5)	1.0 (1.1)	5:40 (3:41)

[20] When calculating the mean times, we included only children at the day care home with five or more drop-offs or pick-ups.

Exhibit 13 shows the number of parents reporting via different means, including SMS (CARS mobile application), CARS website, follow-up phone calls, study hotline messages, and TextMagic. The use of CARS mobile application was the most widely used method of reporting; we also collected a considerable number of drop-off and pick-up times from the CARS website.

Exhibit 13. ***Number of Absent, Drop-Off, Pick-Up Occurrences Reported in CARS by Reporting Method***



Since CARS primarily utilizes free-form patterned messages through SMS, TextMagic, and the like, many have errors needing correction. The most common errors were around the drop-off and pick-up dates and times, particularly correcting for blatant errors 12 hours off. For example, 6:00PM was entered for the drop-off time when it should have been 6:00AM, so a correction was made. Exhibit 14 shows the reasons that led us to correct the CARS responses.

Exhibit 14. ***Counts of Manual Correction in CARS***

Corrections in CARS	Counts of Occurrence
Fixed drop-off date/time	21
Fixed misreporting of am and pm for drop-off time	20
Fixed misreporting of am and pm for pick-up time	12
Added drop-off and pick-up date/time	10
Removed duplicated reporting	9
Fixed pick-up date/ time	8
Deleted reporting of closure	6
Fixed drop-off and pick-up date/time	4
Added drop-off date/time	4
Added pick-up date/time	3
Added Absence	3

Corrections in CARS	Counts of Occurrence
Added Closure	2
Fixed misreporting of closure	1
Deleted reporting of absence	1

4.3 Data from MSRS

The MSRS system output consists of one row per child per day, regardless of activity recorded. In addition to child and provider identifiers, the data file includes absence and closure indicators and timestamps, confirmed flag, and a four-column array indicating the FDCH operating status (open, closed, or partial closure), time meal served, stamp for the time of reporting, and reporting method for each of the six possible serving types. We converted these data to one row per child per meal type for each day to simplify updating with manual data.

As with CARS, daily Excel workbooks were also output for two individual data collectors to contact nonreporting providers. These data were consolidated and used to update the MSRS data. MSRS processing followed ten steps:

1. Read the MSRS system output file.
2. Convert the file from one row per child per day to one row per child per meal type per day.
3. Read and consolidate the manually collected input files.
4. Update the MSRS system output file with the consolidated manual input files. Flag valid records as those with a serving time, an absence indicator, a closed indicator, a *Not Served* status, or a confirmation of meal reporting for the day.
5. Sort by date, provider, and assumed meal sequence of breakfast, AM snack, lunch, PM snack, supper, and evening snack.
6. Assign invalid sequence flag if serving time for subsequent meal type before serving time of prior meal type. Assign valid flag to all provider records for the day if any record for the day is in proper order.
7. Specify last participation date as a maximum date with a valid record.
8. Make AM/PM corrections. If serving time after 6:00PM for breakfast, AM snack, or lunch, subtract 12 hours. If serving time before 6:00AM for PM snack, supper, or evening snack, add 12 hours.
9. Compute the mean serving time for each provider and meal type for providers whose last participation date is November 8, 2017, or greater. These means will be used for the imputation of missing data.
10. For the meal-serving time that was not reported on days a day care was open, substitute the mean meal-serving time of the provider for the missing data. Output the final dataset.

Exhibit 15 shows that, during November 2017, the 63 participating providers served 5,558 breakfasts, 45.3 percent of the total possible breakfasts that could be served. We combined lunch and supper because their reimbursement rates were the same. Similarly, we combined the reporting of snacks in the morning, afternoon, and evening.

Exhibit 15. ***Meal Service Status in MSRS by Meal Types***

Meal Type	Served	Not Served
Breakfast, n (%)	5,558 (45.3%)	6,706 (54.7%)
Lunch/Supper, n (%)	6,045 (24.6%)	18,483 (75.4%)
Snacks, n (%)	7,752 (21.1%)	29,040 (78.9%)

4.4 Lessons Learned from Data Collection and Processing

We make the following suggestions to improve data collection and processing based on lessons learned from the feasibility study.

- **Capture child and provider *MinuteMenu* or other ID at the beginning of the study for consistent use.** This ID could be used in CARS and MSRS or in a cross-reference table linking all tables.
- **Contemporaneously edit times to ensure AM and PM designations are properly entered.** Although it would be ideal to enter all times in a 24-hour clock standard, it is unlikely that parents and providers can readily relate to this. The CARS and MSRS applications could be modified to automatically verify AM and PM designations at the time of entry or perhaps the following day. Simple checks for CARS could be drop-off time before pick-up time. For MSRS, simple checks could be breakfast and AM snack in the morning, and supper, PM snack, and evening snack in the evening. Lunch checks for AM or PM would not work much of the time, but lunch checks for after breakfast or AM snack and before PM snack would be reasonable.
- **Improve text processing of the CARS application.** Most of the CARS entries are free-form texts requiring decomposition or interpretation. Because of the number of errors corrected manually, CARS might be improved to capture and validate more entries automatically.
- **Obtain each State's rules for valid meals at the beginning of the study.** We applied each State's licensing rules regarding the number of children allowed by age or number of caregivers, and elapsed time between meals, if any. These rules should be obtained early to help decide what information needs to be obtained.
- **Modify MSRS to capture two additional data points.** MSRS should be modified to (1) allow input of the number of caregivers present for each meal and (2) if the meal counts as a shift-one or a shift-two meal. The number of caregivers impacts the number of children allowable for a meal, and the shift number impacts the validity of the service times.
- **Obtain office error reports (OERs) from sponsors from *MinuteMenu*.** In addition to the four reports we obtained from sponsors from *MinuteMenu*, the OER report showing why claims were denied in the system would be beneficial. These could be compared with our estimates to further estimate a proxy of the truth.

5. Validating the Data Collection Methods

The goal of the feasibility study is to develop and validate a measurement of improper meal claims (i.e., meals claimed but not served) and the related improper payments under the "business-as-usual" condition, as directed by the Performance Work Statement provided by FNS. In this study, we relied on two approaches to estimate improper payments: (1) a triangulation-based approach that verifies a claim from multiple sources of data and (2) a difference-in-differences approach that estimates error from in an inferential statistical model in an experimental design.

The triangulation approach assumes that improper claims may exist even after sponsors edit the claims. Sponsors may not have had the data needed to determine the validity of every claim. For example, they did not have detailed attendance information, such as when a child is absent for a meal on a day for which the child is enrolled. Compared with the raw claims, the edited claims better reflect accurate claims, although State agencies review the sponsor-edited claims and may make further corrections to claims before issuing reimbursement. As sponsors identify and correct improper meal claims during their review, potential improper payments are avoided. Claims that sponsors correct, therefore, are excluded from the feasibility study. The triangulation-based approach to identifying improper claims, however, does not take into consideration that meal claims may fluctuate across months in the business-as-usual condition.

To control for this natural fluctuation over time and differentiate it from the change in meal claims when MSRS and CARS are implemented, we used a two-group pre-post experimental design, the most rigorous method for testing the effectiveness of an intervention, to improve the accuracy of meal claims. Specifically, we used an experimental design with a treatment condition and a control condition. Under the treatment condition, the providers used MSRS to report meal-serving times. Parents whose children were attending FDCHs included in the treatment condition used CARS to report daily the drop-off and pick-up times of their children, thus enabling us to determine exactly when the children were in attendance. We did not inform providers and parents in the control group of the study to preserve routine practices in a business-as-usual condition.

5.1 Triangulation

The purpose of triangulation is to derive the most accurate records of meals served by providers in the treatment group during the study month (November 2017). Triangulation refers to the process of using multiple data sources to verify a meal claim, which is a provider report of a meal served to a child. Since the study focus was on accurately measuring meals that were claimed but not served, the triangulation process began with data from the child attendance file, which is the basis of meals claimed. If a child was not in attendance for the meal, the meal should not be claimed.

As shown in the left panel in Exhibit 8, we started with the administrative child attendance records to apply rules about meals that should not be claimed based on administrative data. We then compared data parent-reported on child attendance for a given day from CARS with provider-reported data from MSRS to flag meals reported as served when the child was not in attendance. Finally, we compared MSRS data with administrative records to flag meals that were ineligible for reimbursement. We compared the triangulated meal records with the actual meal claims sponsors reimbursed for providers to generate estimates of improper meals.

Sponsors may have had data outside the scope of this study, such as specific menu information, and may have disallowed meals for reasons we do not consider. For this reason, we considered the minimum of our estimated meals served and the sponsor-approved meals to be the most accurate records of actual meals served. These data for the treatment providers in the study month were then combined with the claims in the pre-study months for the difference-in-differences (DD) modeling. A DD model uses a statistical technique to simulate an experimental research design by comparing observed data from a treatment group—in the case data reported during the study month using MSRS and CARS—with a comparison group that uses routine procedures for meal serving and child attendance.

Administrative Record Errors. We used administrative data to ascertain improper meal claims that could have been caught by a sponsor. We identified eight possible such conditions that resulted in an error:

- Serving meal types that were not specified in the approved application with the sponsor, e.g., a provider claimed supper even if they were not approved to serve supper (from the provider information file per Part 226 Child and Adult Care Food Program § 226.18).
- Serving a meal on a day unauthorized for the provider (from the provider information file).
- Serving a meal to a child who was a nonparticipant (from the child information file).
- Not having a child enrollment form on file, not updating the form within the past 13 months, or having an expired form (from the child information file per Part 226 Child and Adult Care Food Program § 226.18).
- Claiming meals for only one child—the provider's own child (per Part 226 Child and Adult Care Food Program § 226.18).
- Claiming a meal that exceeded the maximum number of meals allowed in a day, e.g., a combination of two meals and a snack or two snacks and a meal (per Part 226 Child and Adult Care Food Program § 226.18).
- Claiming meals for a day that exceeded the FDCH's maximum approved capacity, i.e., the maximum number of meals that can be served, as specified in agreement with the sponsor (per Part 226 Child and Adult Care Food Program § 226.18).
- In Texas, the mix of children receiving a meal based on exceeding the authorized capacity depending upon the children's ages. Both Texas and Virginia have rules regarding the number of caregivers necessary to be present based on the mix of children's ages, although we did not have information on how many caregivers were licensed for each provider in Virginia as we did for Texas.

These errors should have been caught by the sponsor before approving payment. The *MinuteMenu* system, if used by a provider, can be configured to uncover many of these errors. This part of the triangulation identifies errors that sponsors should have caught. Errors associated with the meal pattern, such as the actual content of meals served, fall outside the scope for this feasibility study.

Administrative records error processing proceeded as follows:

- Read three administrative files: child attendance, child information, and provider information.
- Read the MSRS processed database file.

- Summarized elapsed times for meals and between the opening and breakfast and last meal served and closing reported by the providers.
- Merged the files.
- Applied the authorization, participation, and enrollment rules. We applied these rules for each meal. These corresponded to the first four of the eight conditions listed above.
- Grouped by date and child. This was necessary to apply the maximum number of meals per day (error 6 in list above).
- Grouped by provider, date, and meal type. This was necessary to evaluate "own child" and capacity errors (errors 5, 7, and 8 in list above).
- Sorted the merged data by provider, date, meal type, and descending child birthdate (from the child attendance file).
- Applied two-and-one, own child, and capacity rules.
  - The two-and-one logic was applied to specific meals sequentially. If the meal count equaled three, breakfast was designated as the improper meal because its reimbursement value was lower than the other two meals. If the snack count equals three, AM snack is defined as the improper snack. For errors over two meals and one snack, and one of the snacks was AM snack, the AM snack became an improper snack. Proceeding through the logic, the PM snack was designated as improper, then the evening snack.
  - If the only child at a meal is the provider's own child, the meal was marked as improper.
  - In applying the maximum capacity rule, meals served over the capacity were flagged as improper to the oldest children first. MinuteMenu uses this logic. Only the incremental meals over capacity were flagged as improper. For instance, if the maximum capacity is 12 and the provider showed 14 children received the meal, the meals served to the two oldest children were improper. Capacity errors were computed separately for the first serving time (the vast majority of cases) and second serving time.
  - The Texas, child mix capacity rules were applied in a manner similar to the maximum capacity rule. The oldest children who received meals over capacity were improper.
  - Since multiple errors may have existed for any given meal, a flag was established for any errors, so the improper meal was only counted once.
- Outputted the Detailed Child Attendance/Admin Errors intermediate dataset. This was used later in the final triangulation process.
- Summed the served meals from the child attendance records.
- Summed the improper meals.
- Read the claims data.
- Merged the summarized data together. Because the reimbursement rates were based on tiers, we had to estimate the meals served by tier. We summed the tier 1 and tier 2 meals claimed by meal type (from the claims file) for each provider. We estimated the meals served after adjusting administrative records for the meal type as the sum of the served meals minus the improper payment flag. We allocated to tiers based on the providers' tier-approved claims as a percentage of their total claims for that meal type. If a provider only submitted tier 1

claims, 100 percent of their estimated meals were tier 1. One provider had mixed claims, and so their meals were allocated to the tiers based on their percentage.

- Output the Summarized Child Attendance/Admin Errors intermediate dataset. This was used later in the final triangulation process.
- Took the minimum of the estimated and the sponsor-approved meals. Since sponsors may have had data that we did not have, we prepared a Final Claims Meal Errors datafile for modeling that used the minimum of the sponsor-approved meals and our estimated meal count.
- Output the resulting Claims Meals/Admin Errors for Modeling intermediate dataset.

Exhibit 16 shows the steps in the triangulation process.

Exhibit 16. ***Triangulation—Administrative Record Errors***

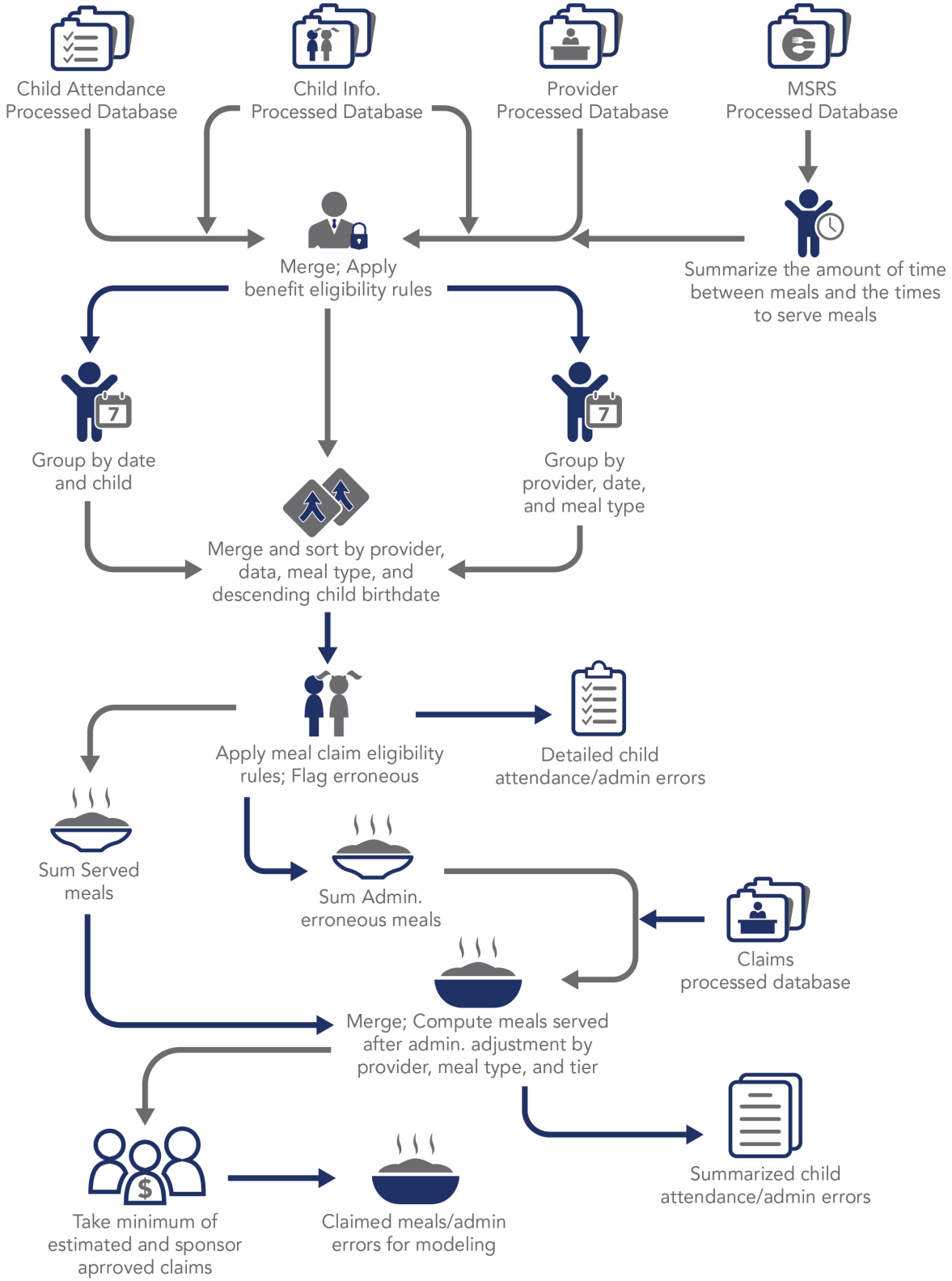


Exhibit 17 shows the number of errors in meal claims after we applied the administrative rules to meal claims providers submitted to sponsors. Errors in Exhibit 17 may well be identified by sponsors in the review process; if not, they would result in meal claim errors. The greatest number of errors stemmed from exceeding the maximum number of meals allowed for a day (a two-and-one error). These account for about half the total. Capacity-related issues, both from exceeding the maximum capacity in both states or from the child mix specifically for Texas, represent the next highest category. A number of errors also occurred because a meal was claimed for a child not participating in CACFP. Child enrollment problems and unauthorized serving types were rare. A total count of 1,322 errors occurred.

Exhibit 17. ***Errors of Meals Served by Type at the Child Level Identified After the Application of Administrative Rules***

Meal Type	Only Own Child Present	Serving Unauthorized for Provide	Serving Type Unauthorized for Provider	Child not Participate in CACFP	Child Enrollment Expired	Two-and-One problem[1]	Serving Over Max Capacity[2]	Serving Child Mix Over Meal Capacity - TX[2]	Total[3]
Breakfast	30	16	0	40	0	101	16	70	263
Lunch	8	15	0	47	0	0	0	84	154
Supper	0	0	0	17	0	0	24	0	41
AM Snack	0	3	0	13	0	493	0	45	541
PM Snack	44	22	0	48	0	81	55	73	320
Eve. Snack	0	0	1	0	0	3	0	0	3
Total	**82**	**56**	**1**	**165**	**0**	**678**	**95**	**272**	**1,322**

[1] Meals were eliminated in this order: Breakfast, AM Snack, PM Snack, Evening Snack.

[2] Meals were corrected for only those over capacity with the oldest child first. For example, if six present and four is capacity, the oldest two are considered improper.

[3] Totals may not sum because multiple reasons were eliminated in the total, such that each meal for a child could only have one error.

Source: Child Attendance File

CARS Errors. Since parents have no vested interest in inflating meal counts, parental data from CARS should provide an unbiased report on child attendance time, which serves as the validation of providers' reporting of meals served. The CARS data shows the drop-off and pick-up times of each child and if they were absent or the provider was closed. Sponsors would not have this data to adjust the provider claims.

We first merged the CARS data (one row per child per date) with the MSRS data (one row per child per date per meal type) that the providers entered daily by date and child ID. We then merged these data with the detailed child attendance error data file, as described in the section above.

One issue with the three major data sources (CARS, MSRS, and child attendance) is conflicting data on closures. Within CARS itself, conflicting reports of closures may come from different parents. One parent may have shown the provider as closed, while another may have reported they dropped off and picked up their child on the same date. The provider may have also shown as being open that day in MSRS, but there might have been no attendance records submitted. We summed the data from the various sources by provider to determine a closure probability.[21]

Similarly, an absence probability was also computed. For absences, however, there was no possible conflict with CARS data. This is because if a parent communicated an absence through CARS the child was designated as absent.

To determine meals claimed when a valid drop-off or pick-up record existed, we allowed a 30-minute window before the meal was considered improper. If the meal serving time from MSRS was more than 30 minutes prior to the drop-off time, the meal was improper because it was served before the drop-off time. If the meal was served after the pick-up time plus 30 minutes, the meal was improper for being served after the pick-up time.

The number of CARS adjustments of the MSRS-claimed meals were summed across reasons. The majority have only one reason.

MSRS Errors. For meals that were adjusted based on CARS attendance data, we evaluated the meals for conflicts with the provider-entered data into MSRS. We assessed only the meals supplied on non-holiday weekdays (note that the November study month included the Thanksgiving holiday and, for some providers, the day after Thanksgiving), and determined that a payment was improper, if claimed, and one of the following conditions was met:

---

[21] **For CARS errors:**

Closures (by day): We summed the number of parents reporting a closure for the day in CARS. If some parents reported a closure and the number reporting a closure is greater than the number reporting a pick-up, drop-off, or absence, we give the reporting a value of one to CARS closure. If a provider reported "Closed Today," we assigned one to MSRS closure. If the provider reported no meals served for the day, assign 1 to No Attendance Data. Sum CARS closure, MSRS closure, and No Attendance Data. This ranges from zero to three. Other data was collected to see if there were any CARS, MSRS, or Attendance Data for the day. These are all binary variables. We sum them to get the number of closure sources, which ranges from one to three. Compute the closure probability by dividing the sum of the sources indicating a closure by the number of reporting sources for the day. For any meals served that day, use this probability for an expected value that the meal is served in error. The range is zero to .6667.

Absences (by specific meal): We summed CARS absent, MSRS absent, and No Attendance Data (for the day). This ranges from zero to two and we then divided the sum by the closure sources stated above. If there's conflicting data from CARS (e.g., an absence and pickup or drop off), we set the absence probability to zero. If they are reported absent in CARS, set the absence probability to 1. We used this probability for the expected value that the meal is served in error, which ranges from zero to one. We summed all the possible CARS issues (meal served when closed, meal served when absent, meal served before drop-off, meal served after pickup). The range is zero to one.

For MSRS Errors (if questionable CARS is not flagged as 1):

If a provider reported in MSRS "Closed Today," we assigned one to MSRS closure, which indicates meal served in error. The value of this indicator is either zero or one. If MSRS shows a child was absent, any meal served to that child was in error. It's either zero or one. We summed all possible MSRS issues. The range is zero to three.

"Disallow" a meal if questionable CARS total or MSRS total is equal or greater than one. The net result is that none of the CARS closures result in a disallowed meal while 155 reported absences do. All the MSRS closures and absences result in disallowed meals.

- Provider was closed for that day or relevant part of the day.
- Provider entered the child as absent for that meal.
- Provider specifically indicated that the meal was "Not Served."
- Provider entered a serving time before the provider's opening time (from the provider information file).
- Provider entered a serving time after the provider's closing time (from the provider information file).
- The serving time for the specific meal type was before or after the provider's meal time (from the provider information file).
- Specific policies regarding meal service times for Texas, including:
  - Insufficient elapsed time between meals and snacks;
  - Too much time to serve a meal or snack; and
  - Supper time too early, too late, or too close to closing time.

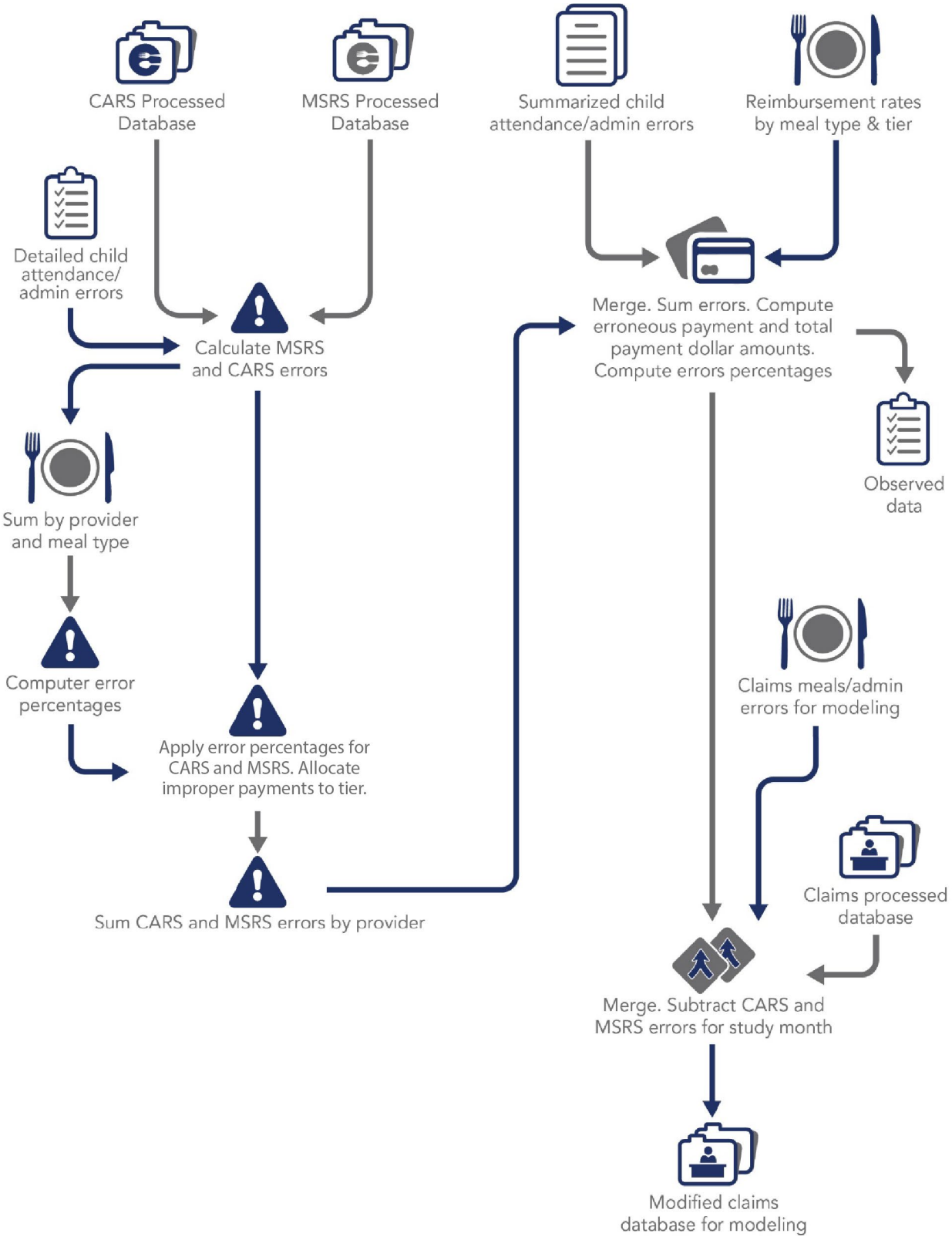
Total Errors. We then summed the improper meals for MSRS conditions and flagged improper meals based on MSRS or CARS data. We created a flag to keep track of meals after adjustments based on data from sponsors and CARS.

We then summed the data by provider and meal type and computed error percentages. Because not all of a provider's parents participated in CARS, and of those participating, they did not always submit complete data for a day, we applied the CARS error percentage to all records for a provider based on CARS reporting from parents who provided complete data. Similarly, we applied the MSRS error percentage to all records for the provider. As required to determine the dollar amount of improper payments, we assigned improper payments to tiers based on the provider's tier code, or in the case of the mixed-tier provider, the child's tier code. This was necessary because the reimbursement amount varied by tier.

We then summed CARS and MSRS errors by meal and tier for each provider and merged with the summarized child attendance error data file. Total errors were calculated as the sum of the administrative records errors, CARS errors, and MSRS errors. Reimbursement rates were used to obtain the improper payments dollar amount and the estimated provider original submission amount based on the child attendance records. We computed improper payment percentages for the number of meals and dollar amounts and generated a data file with all the observed data with flags for all errors we discussed above.

To prepare a data file for the difference-in-differences modeling, we merged the minimum meal counts by provider from the administrative records error process with the CARS and MSRS adjustment data process and claims file. We subtracted the CARS and MSRS adjustments from the administrative records error process meals to get to the final best records of meals served for the treatment group in the study month. These data were then used for the modeling process. Exhibit 18 depicts the steps used to identify errors by triangulating CARS and MSRS data.

Exhibit 18. ***Steps to Identify Errors in Meal Claims Using CARS and MSRS Data***



Applying the CARS and MSRS portions of the triangulation process uncovered 3,513.5 estimated errors, as shown in Exhibit 19. The first six columns display the errors discovered by utilizing parental reporting. If we had missing data on CARS regarding a child's drop-off time, we filled it in with the typical drop off time of that child (ref. footnote in Appendix 1); similarly, if we had missing data on meal serving time on MSRS, we used the typical time the provider served that meal. These project values were then used to calculate meals served before a child was dropped off or after a child was picked up, as well as MSRS errors in Exhibit 19. The major error factor is meals served before the child is reported as being dropped off. As expected, this is a problem with breakfast and somewhat with AM snacks. Parents also reported their child as absent a number of times when the provider claimed the child in attendance for a meal. In the case of attendance, the parent's report was always considered correct, thus making the provider claim improper. Overall about one-third of the total errors were discovered using CARS data and two-thirds from MSRS.

Exhibit 19. ***Claim Errors Identified through Triangulation of CARS, MSRS, and Administrative Data, by Error Type***

Meal Type	Child Absent	Provider Closed	Meal Served Before Drop-off		Meal Served After Pick-up		MSRS Error	Total Error [1]
	Actual	Actual	Actual	Projected	Actual	Projected	Projected	Projected
Breakfast	58.5	42.2	110.0	347.9	0.0	0.0	566.0	1,046.3
Lunch	67.0	40.8	19.0	115.2	2.0	3.3	830.4	1,085.2
Supper	6.7	3.0	0.0	0.0	12.0	21.4	126.8	156.1
AM Snack	31.8	7.3	8.0	142.9	0.0	0.0	156.0	389.8
PM Snack	45.5	37.2	5.0	8.9	35.0	67.9	615.8	761.9
Eve. Snack	1.0	0.0	0.0	0.0	2.0	7.0	67.3	74.3
Total	**210.5**	**130.5**	**142.0**	**614.9**	**51.0**	**99.6**	**2,362.3**	**3,513.5**

[1] Totals may not sum because of projections not shown and duplicate elimination.

Sources: CARS, MSRS, and Adjusted Child Attendance

Exhibit 20 breaks out the MSRS errors into various causes. The major error type was serving a meal before the standard time, which is more than half the total. By meal, this was especially a problem for breakfast, lunch, and AM snack. Meals served after the standard time was also a problem. We also found a large number of errors when the Texas providers did not allow enough time between meals. Virginia may have similar requirements, but the state agency could not provide us with official documents for such requirements. In total, we found over 5,000 improper meals from using MSRS data. Since our order of precedence in error reporting began with CARS and we avoided double-counting, the projected number of improper meals attributed to MSRS fell to 2,362.3.

Exhibit 20. ***Meal Claim Errors Identified through MSRS, by Error Type***

Meal Type	Child Absent	Provider Closed	Meal Reported as "Not Served"	Meal Serving Time Outside Operating Hours	Meal Served Before Standard Time	Meal Served After Standard Time	TX Only – Insufficient Elapsed Time Between Meals	TX Only – Over-reporting of Meal Serving Time	TX Only – Supper Time Too Early, Too Late or Close to Closing	Total MSRS	
										Actual[1]	Projected[2]
Breakfast	64	100	20	3	695	510	0	108	0	1,377	566.0
Lunch	63	98	5	17	761	38	469	126	0	1,532	830.4
Supper	7	9	7	1	172	6	17	0	17	209	126.8
AM snack	18	22	2	0	479	140	235	0	0	835	156.0
PM snack	64	81	15	9	642	401	85	144	0	1248	615.8
Evening snack	2	0	1	40	96	0	2	0	0	138	67.3
Total	**218**	**310**	**50**	**70**	**2,845**	**1,095**	**808**	**378**	**17**	**5,339**	**2,362.3**

[1] Totals may not sum because of duplicate elimination.

[2] Projected numbers lower than actual because MSRS correction only applied to records without a CARS adjustment to avoid over-counting.

Sources: CARS, MSRS, and Adjusted Child Attendance

The average provider incurred 16.2 improper meal claims over the study month, uncovered through the CARS and MSRS triangulation process (see Exhibit 21). Of the providers claiming each specific meal, breakfast, lunch, AM snack, and evening snack were about equally problematic. Because so many more providers claimed breakfast and lunch meals, they account for the most errors.

Exhibit 21. ***Total Errors in Study Month Identified Through Triangulation of CARS, MSRS, and Administrative Data, by Meal Type***

Meal Type	Number of Providers	Average Number of Improper Meals per Provider[1]	Total Error
Breakfast	59	17.7	1,046.3
Lunch	60	18.1	1,085.2
Supper	15	10.4	156.1
AM snack	22	18.6	389.8
PM snack	58	13.1	761.9
Eve. snack	4	18.6	74.3
	Total	**16.2**	**3,513.5**

[1] Of the 63 providers who initially agreed to participate, 61 used MSRS beyond the first week. The mean is of providers claiming that specific meal type. For example, only four providers had any claims for evening snacks, so the mean is for those four providers.

Sources: CARS, MSRS, and Adjusted Child Attendance

In looking at the CARS and MSRS error percentages by meal type, evening snack—the lowest claimed meal by four providers—had the highest percentage of errors at 40.6% (see Exhibit 22). AM snacks had a 27.3 percent error rate, and all three types of meals had similar error rates. The overall error rate was 17.5 percent (of the net meals after correcting for administrative errors). Appendix 5 shows the percentage of errors due to meals claimed but not served.

Exhibit 22. ***Error Rates by Meal Type***

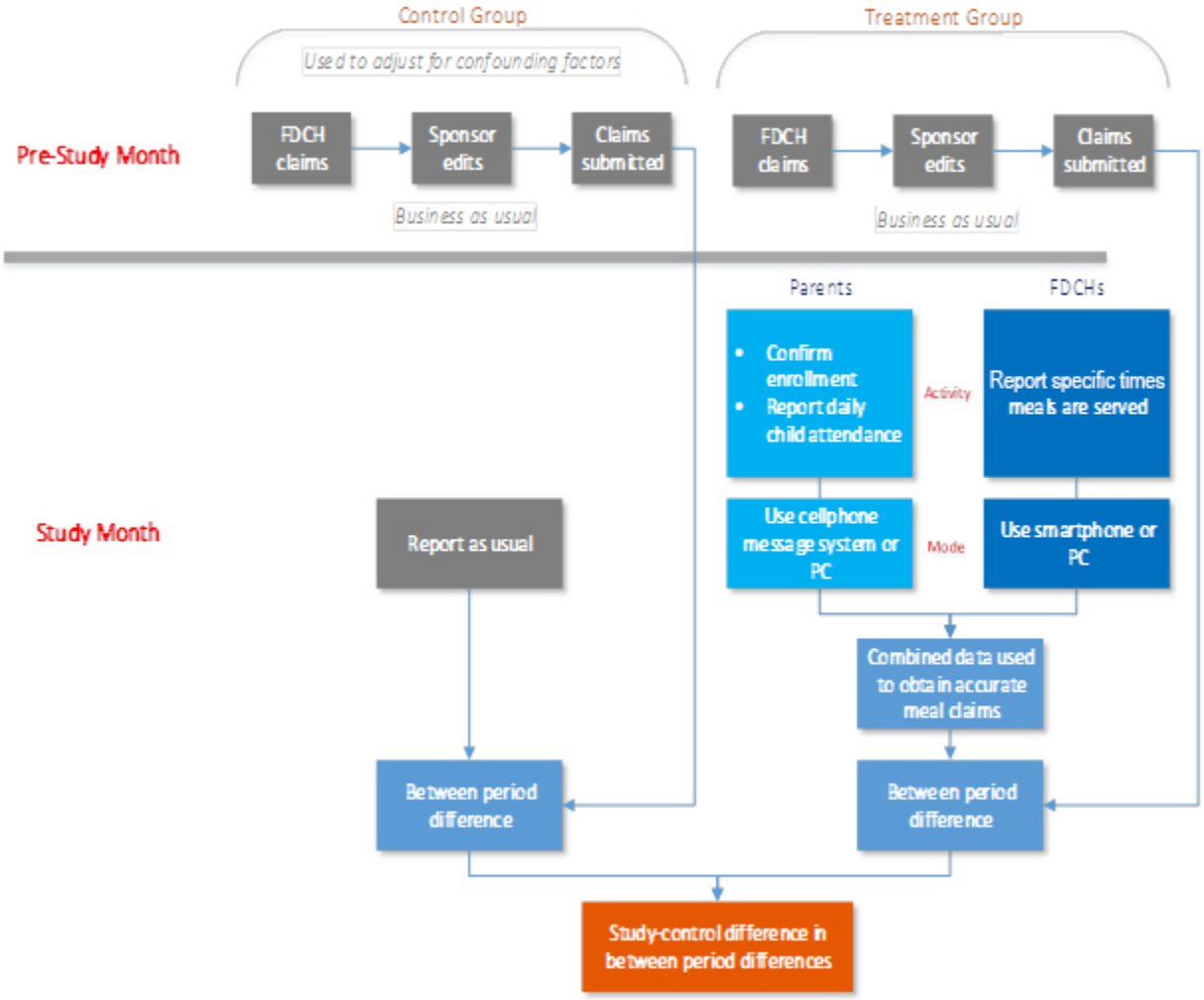
Meal Type	Error Rate
Breakfast	17.90%
Lunch	17.90%
Supper	19.10%
AM snack	27.30%
PM snack	13.20%
Evening snack	40.60%

5.2 Difference-in-Differences Method

We applied the two-group experimental design in two study periods—a study month and two pre-study months—to test the assumption that MSRS and CARS allow us to identify errors in meal claims and therefore allow us to improve the accuracy of the meal claims reported by the treatment group during the study month. Exhibit 23 illustrates the conditions of the control and treatment groups across the two study periods. The control group was in the business-as-usual

condition throughout the study. The treatment group was in the business-as-usual condition in the pre-study months and used MSRS or CARS in the study month.

Exhibit 23. ***Overview of the Experimental Design***



It is worth emphasizing that the treatment is intended to produce proxy measures of the actual meals served. We expected the meal claims from providers in the treatment group to be more accurate or truthful than claims made by providers under the business-as-usual condition, assuming that providers in the treatment condition were aware of the study and thus more vigilant about claiming meals during the study month. However, the resulting report of meals served can still differ from the actual meals served, as our approach could not identify meals claimed but not served in some possible scenarios, for example, if a child brought lunch on a particular day.

Random Assignment. To minimize selection bias, we randomly selected providers affiliated with the same sponsors and assigned them to the treatment and the control groups.[22] We asked the selected ten sponsors to provide records for all active providers. Within each sponsor, we stratified by urbanicity and FDCH size (i.e., the number of children enrolled) and randomly selected providers within each stratum and assigned them to the treatment or the control group. The power analysis showed that, with each sponsor, we would need ten providers in the treatment group; we oversampled providers to make up for the ineligibles and refusals (i.e., providers who did not have access to mobile devices or the Internet, or selected providers who refused to participate in the study). We did not contact the control group providers and only collected their administrative records and meal claim data from the sponsors.

Difference-in-Differences (DD) Modeling. DD modeling is conventionally used to establish causal effects of a program intervention. In this study, we use the DD model to test whether the data collection would yield an estimate that served as a proxy of the truthfulness of meal claims, for which it also is well suited. In this section, we present a basic DD model with ordinary least squares regression (Equation 1). Because some parents in participating day care homes gave their consent to participate in the study (by reporting children's pick-up and drop-off times), but not all, we would not be able to aggregate claim numbers from the child level to the provider level. As a result, we simplified the model from a two-level nested structure to a single-level regression analysis.

Exhibit 24 shows that, for a given meal type, we calculated: (1) the aggregate number of meals for each of the two groups in the pre-study and study months ($\hat{y}$); (2) the change over time between pre-study months and study month for each group ($\boldsymbol{\Delta}\hat{y}$); and (3) the group difference in each group's change over time ($\boldsymbol{\Delta}\hat{y}_a - \boldsymbol{\Delta}\hat{y}_b$ or DD), which indicates the effect of our proposed approach in reducing improper claims for the treatment group, net of unmeasured time effects (changes in meal claims across the months due to factors other than the intervention). If the resulting DD estimate is substantially large and statistically significant, we would consider it as a valid measure of improper claims.

Exhibit 24. ***DD Analysis***

	Pre-study Months	Study Month	Between-month Difference
Treatment	$\hat{y}_{at1}$	$\hat{y}_{at2}$	$\hat{y}_{at1} - \hat{y}_{at2} = \boldsymbol{\Delta}\hat{y}_a$
Control	$\hat{y}_{bt1}$	$\hat{y}_{bt2}$	$\hat{y}_{bt1} - \hat{y}_{bt2} = \boldsymbol{\Delta}\hat{y}_b$
Group Difference Between Pre-study and Study Month			$\boldsymbol{\Delta}\hat{y}_a - \boldsymbol{\Delta}\hat{y}_b$

[22] We have considered and dismissed alternatives to group assignment, for example, selection of samples by matching the groups. Sample matching between the two groups is not desirable or feasible because sufficient information on provider background is essential for sample matching, yet only limited data on provider characteristics (e.g., location and meal claim numbers) were available.

The relation among the quantities in Table 13 can be expressed as:

$$y_i = b_0 + b_1X_i + b_2\,T_i + b_3\,X_iT_i + e_i, \qquad (1)$$

where X_i is an indicator for a provider's status in the treatment or control group, T_i denotes time (pre-study months vs. study month), and b_1 and b_2 are estimates of, respectively, the treatment and the time effects on meal claims (i.e., $(\hat{y}_{at1} - \hat{y}_{bt1})$ and $\boldsymbol{\Delta}\hat{y}_b$). The parameter b_3 is associated with the interaction term, X_iT_i,, which is the DD estimate, or $\boldsymbol{\Delta}\hat{y}_a - \boldsymbol{\Delta}\hat{y}_b$. The DD estimate in relation to other regression coefficients is shown in Exhibit 25.

Exhibit 25. ***DD Estimates in Regression Modeling: A Simplified Explanation***

	Pre-study Months	Study Month	Difference
Treatment	b_0+b_1	$b_0+b_1+b_2+b_3$	b_2+b_3
Control	b_0	b_0+b_2	b_2
		Difference-in-Differences Estimate	$\boldsymbol{b_3}$

We used DD modeling to determine if the treatment effect in reducing overclaims is statistically significant, net of the time effects and other effects of covariates, if any. We then added provider variables available for both control and treatment groups into the equation as covariates in an attempt to increase model fit and estimate precision. Such covariates must be conceptually relevant to meal claims and empirically predictive of meal claims to be included. We used two such covariates: providers' meal claiming method[23] (e.g., electronic filing vs. paper filing) and the number of children enrolled.

To test if the between-month discrepancy in meal claims was statistically significant between the control and the treatment group, we estimated an equation to test the treatment-time interaction effect b_3.

- If b_3 is positive and large in magnitude, it indicates that the reduction in meal claims from the pre-study month(s) to the study month is substantially greater for the treatment group than for the control group, controlling for the time effects.
- If b_3 is also statistically significant at $p < .05$ level, it suggests that the group difference in cross-month claim reduction is unlikely to occur by chance.

Together, this statistical evidence would imply that the treatment effectively reduced improper claims.

It is plausible to consider the number of claims of the treatment group in the study month as a proxy for the "truthful" measure of meals served. We then compare it with the claims the treatment group filed in the pre-study months to identify overclaims. We used a generic threshold of 0.35 effect size for the hypothesis test.

We used the DD model to validate the data collection method, assuming that our intervention should help encourage accurate meal claiming and reduce overclaiming, thus resulting in fewer claims for the treatment group during the study month. The DD modeling controls for

[23] While substantial numbers of providers now file claims electronically, we learned that many still file claims in hardcopy.

confounding factors that may contribute to the declining (or whatever variation of) meal claims for the group in the study month.

The focus of the DD modeling was to determine if the two groups' difference in their between-period differences in meal claims was substantial and statistically significant. The DD modeling statistically controls for the time effects (i.e., changes in meal claims across the months due to factors other than the intervention) and the two groups' background differences (enrollment size and rural-urban location), producing strong evidence validating the feasibility study, relative to many other analytic approaches. If, as hypothesized, the treatment group shows a between-period reduction in meal claims that is larger than that for the control group, we may conclude that the feasibility study has indeed generated more truthful measures of meal service.[24]

5.2.1 Data and Descriptive Statistics

We created the following meal claim measures for the modeling:

- For providers in the treatment group, business-as-usual meal claim counts in the two pre-study months and the triangulated meal counts in the study month
- For the control providers, all three months meal claims collected through business-as-usual
- For both groups, rural-urban location and enrollment size collected from the administrative records

Exhibit 26 displays the numbers of providers whose monthly meal claims records were available for analysis. The dataset, produced after numerous iterations of cleaning, editing, imputation, and cross-source reconciliation, contains a total of 849 cases. A case is a provider-month record with meal claim information. Of the 849 cases, 666 are of the control group and 183 the treatment group.[25] In the SAS analytic dataset, records were sorted by provider ID so that each provider (222 of the control and 61 of the treatment) had three-month records with varying meal claims and the same background information. We removed cases that did not have the full three-month meal counts.

Exhibit 26. ***Description of Provider Sample (Providers with 3-Month Meal Claims)***

Group	Study Month	Pre-study Month 2	Pre-study Month 1	Total
Control	222	222	222	666 (78.45%)
Treatment	61	61	61	183 (21.55%)
Total	**283 (33.33%)**	**283 (33.33%)**	**283 (33.33%)**	**849 (100.00%)**

Data source: Modifiedc_claims_20180910

[24] The "truthfulness" of meal claims is extremely difficult, if not impossible, to measure. We obtained relatively truthful measurement based on reasoned comparisons with the DD analysis.

[25] We kept all providers that were not randomly selected to the treatment group in the control group instead of randomly selecting a subsample to these providers for the control condition. This leads to an unbalanced sample with a study-control ratio slightly higher than 1:4. Research shows the precision of estimation erodes when the ratio is lower than 1:4 (Bloom, 2006).

To ensure sufficient power of analysis, we modified the treatment and control group identification by including in the control group some providers that were sampled in the treatment and failed to participate, but that had the three-month meal claims available.

The records in the source dataset for modeling have detailed claim counts for each of the six meal types at the two tiers, with different reimbursement costs. As meals were in three cost categories, breakfast, lunch and supper, and snacks, we thus combined the six meal types into three. Given the need to analyze meal data separately by tiers, we tested models of meal counts separately by tiers, and found too few tier 2 meal counts to obtain meaningful estimates (approximately 10–20 percent of meal counts were in tier 2). Therefore, we consolidated meal counts of breakfast, lunch and supper, and snacks without regard to tier. Exhibit 27 describes the meal claim patterns of the two groups across the three months, showing the mean and 95 percent confidence interval for each group in each month.

We combined lunch and supper when reporting results based on the difference-in-differences models. This is mostly because of the low counts of supper, which will not allow us to build a robust model to produce reliable results for supper alone. Since lunch and supper have the same reimbursement rate, we combined the two meal types when running the models so we can use the model coefficients to calculate IP.

Exhibit 27. ***Descriptive Statistics: Meal Claims, by Group Status, Study Time Period, and Month***

Group	Period	Month	Meal Type	Mean	Confidence Level for Mean	
					Lower 95%	Upper 95%
Control, n=666	Pre-study	Pre-month 2	Breakfast	108.7	98.3	119
			All snacks	166.5	152.7	180.4
			Lunch and Supper	164.9	149.5	180.4
		Pre-month 1	Breakfast	99.1	89.6	108.7
			All snacks	154.3	140.6	167.9
			Lunch and Supper	150.8	136.4	165.2
	Study	Study month	Breakfast	99.7	90.3	109.1
			All snacks	151	137.7	164.4
			Lunch and Supper	153.2	139	167.4
Treatment, n =61	Pre-study	Pre-month 2	Breakfast	119	103.8	134.3
			All snacks	154.3	136.4	172.2
			Lunch and Supper	143.2	120	166.4
		Pre-month 1	Breakfast	106.3	92.2	120.4
			All snacks	140.1	122.7	157.6
			Lunch and Supper	129	107.3	150.7
	Study	Study month	Breakfast	89	75.9	102.1
			All snacks	112.2	96.3	128.1
			Lunch and Supper	105.9	86.8	124.9

Data source: Modifiedc_claims_20180910

Furthermore, as depicted in Exhibit 28, we calculated descriptive statistics to show the group difference in between-period differences in average meal claims (without statistical control). It seems clear that (1) both groups' average meal claims across all three meal types declined from the pre-study months to the study month, and (2) the treatment group's between-period declines were greater than the control group's declines, again largely consistently for all three meal types.

Exhibit 28. ***Descriptive Statistics: Group Differences in Meal Claim Change between Pre-Study and Study Months***

Meal Type	Study Period	Mean Meal Claims		Group Difference Over Time
		Treatment Group	Control Group	
Breakfast	Study month	*89.0*	*99.7*	
	Pre-study months	*112.7*	*103.9*	
	Between-period change	*−23.7*	*−4.2*	−19.5
Lunch and Supper	Study month	*105.9*	*153.2*	
	Pre-study months	*136.1*	*157.9*	
	Between-period change	*−30.2*	*−4.7*	−25.6
Snacks	Study month	*112.2*	*151.0*	
	Pre-study months	*147.2*	*160.4*	
	Between-period change	*−35.0*	*−9.4*	−25.6

Data source: Modifiedc_claims_20180910

5.2.2 Difference-in-Differences Modeling Results

The DD equation is written as:

$$y_i = b_0 + b_1 X_i + b_2 T_i + b_3 X_i T_i + e_i, \qquad (1)$$

Where y_i is the expected meal claim count for provider i;

b_0 denotes intercept of the equation;

b_1 is group effect and X_i is group indicator;

b_2 is time effect and T_i indicates the pre-study (including 2 months) vs. study periods (1 month);

b_3 is the focal estimate in this study, representing the group difference in between-period difference in meal claims (DD);

X_iT_i denotes the cross-product or interaction of the group and time; and

e_i is the error term, assuming normally distributed with a mean of zero.

Three equations, respectively for meal counts of breakfast, lunch and supper, and snacks (on both tiers), were estimated using a SAS mixed procedure. Note that we do not show the two covariates, rural-urban location and enrollment size, from the above equation, although they were specified in the model. The point of the omission is to help readers focus on the DD estimation; the reason for this is that while the two background variables were statistically controlled for, their effects on

meal claims are not major features of interest to the study. We also do not present the coefficient estimates of the two covariates in the following tables.

The three models fit the data reasonably well, with chi square tests that are large and statistically significant (Exhibit 29), implying that, with specified effects, the models fit the data better than the null model with intercept only. Model diagnostics with residual analysis and predicted scores plotting also suggest an acceptable model fit.

With the model for breakfast, the intercept, b_0, estimated 83.57, indicates the average claims by the treatment group in the study month (Exhibit 44). The group effect, b_1, estimated 11.78, not statistically significant, gives no evidence that breakfast claims by the two groups were different, net of time effects and other factors (location and enrollment size). The time effect, b_2, estimated 23.64 with $p < 0.0001$, indicates that, on average, the pre-study period's meal claims were almost 24 times larger than the study period's, again controlling for the effects of group difference and location and enrollment size. Estimates from models of lunch/supper and snacks followed similar patterns.

The DD effect, b_3, was considerably large and statistically significant, as estimated from the three models (Exhibit 29). For breakfast, the coefficient was estimated −19.4 and statistically significant at $p < 0.0001$ level. It suggests that while both groups experienced decreased breakfast claims from the pre-study period to the study period, the treatment group's decrease was 19.4 on average more than the control group's decrease, net of time effects and the effects of enrollment and rural-urban locations.

Exhibit 29. ***Difference-in-Differences Regression Model of Meals Claimable: Coefficients and Model Fit Indices***

Meal type	Parameter	Estimate	Standard Error
Breakfast	Intercept, b_0	83.57*	8.35
	Group effect, b_1	11.78	9.06
	Time effect, b_2	23.64*	2.87
	Group X Time effect, b_3	−19.40*	3.24
	Null model likelihood test Chi square (df=1)	1,086.99*	
Lunch and Supper	Intercept, b_0	106.35*	12.60
	Group effect, b_1	45.90†	13.67
	Time effect, b_2	30.24*	4.13
	Group X Time effect, b_3	−25.61*	4.66
	Null model likelihood test Chi square (df=1)	1,138.13*	
Snacks	Intercept, b_0	109.60*	10.85
	Group effect, b_1	38.39†	11.77
	Time effect, b_2	35.01*	3.63
	Group X Time effect, b_3	−25.64*	4.10
	Null model likelihood test Chi square (df=1)	1,116.51	

N=849 (provider-month records); *$p < 0.0001$, †$p < 0.001$

With models of lunch/supper and snack, the DD effects were also substantial and significant, respectively estimated −25.61 and −25.64, both at $p < 0.0001$ level. The consistent findings allow us to say that the intervention executed in the study effectively reduced the treatment group's meal claims in the study month, and hence the resulting measurements were likely close to the reality of meal services.

In short, we consider that the feasibility study was validated by the analysis and that we can proceed to estimate the improper claims and payment based on these findings.

5.3 Estimation of Improper Payments

The triangulation yielded a datafile with meals that, to our best knowledge, providers in the treatment group could be reimbursed for in the study month. Along with meal claim records in the pre-study month, the triangulation file allows us to compare the meal reporting over time and identify changes in reporting patterns that may attribute to reporting errors.

We used two approaches to estimate the improper payment, one with observed data and the other with inferential estimates based on the DD models discussed previously. In this section, we describe the application of these two approaches and report the estimates of improper payments. While the DD models yield higher improper payment rates, both methods suggest an error rate that requires a program-wide inspection, as the error rate is greater than 10%.

5.3.1 Estimation of Improper Payments Using Triangulated Data

The observed data error estimation began with the child attendance data submitted by providers. The triangulation process flagged numerous child attendance meals as improper. We separated the improper and net meals into tiers to properly apply reimbursement rates. The reimbursement rates are shown in Appendix 3.

The final results determined that 4,834.5 meals were improper for the 61 providers participating throughout the study month, as shown in Exhibit 30. The dollar amount of overpayments totals $6,316 at a weighted average cost per meal of $1.31. Lunch/supper accounts for over half the dollar amount of the errors.

Exhibit 30. ***Observed Data Calculation of Meal/Snack Overclaims and Resulting Dollar Values of Overpayment***

Meal Type	Total Improper Claims	Cost per Meal[1]	Dollar Value of Overpayments
Breakfast	1,309.3	$1.23	$1,604.15
Lunch and Supper	1,436.2	$2.30	$3,300.19
Snack	2,088.9	$0.68	$1,412.30
Total	**4,834.5**	**$1.31**	**$6,316.64**

[1] Weighted Average of Tier 1 and Tier 2 Rates

Source: Triangulation, n=61

On a percentage basis, we estimated that 20.6% of the meals claimed were in error, as shown in Exhibit 31. Errors were evenly distributed across meal types, with snacks accounting for a slightly higher percentage than breakfast and lunch/supper.

Exhibit 31. ***Counts and Percentage of Overclaims Based on Child Attendance Counts***

Meal Type	Total Improper Claims	Child Attendance	Percentage
Breakfast	1,309.3	6,747	19.4%
Lunch and Supper	1,436.2	7,850	18.3%
Snack	2,088.9	8,906	23.5%
Total	**4,834.5**	**23,503**	**20.6%**

Source: Triangulation, n=61

As Exhibit 32 shows, we estimated an overall error rate of 20 percent of payments. While the highest dollar amount was for lunch/supper, this is the lowest percentage because of the higher dollar amount of submitted claims for these meals. We estimate that providers should have submitted reimbursement requests for $31,571.72 based on their child attendance records. Sponsors approved $31,953.44 in payments to these providers, so our estimate is close to what was actually paid. Please note that we believe providers are entitled to $25,255.08 in reimbursements ($31,571.72, the amount providers should have submitted reimbursement requests for, minus $6,316.64. the amount of overpayments) after applying the results from the triangulation process. A rough breakdown of the errors is: five percent administrative records; five percent from parental reporting through CARS; and 10 percent from contemporaneous provider reporting of meal service times through MSRS (See Appendix 5 for information regarding the estimates of meals reported but not served). We also rigorously applied rules that are in place but might not have been completely enforced, primarily around valid meal service times, because of a lack of data or perceived need for flexibility.

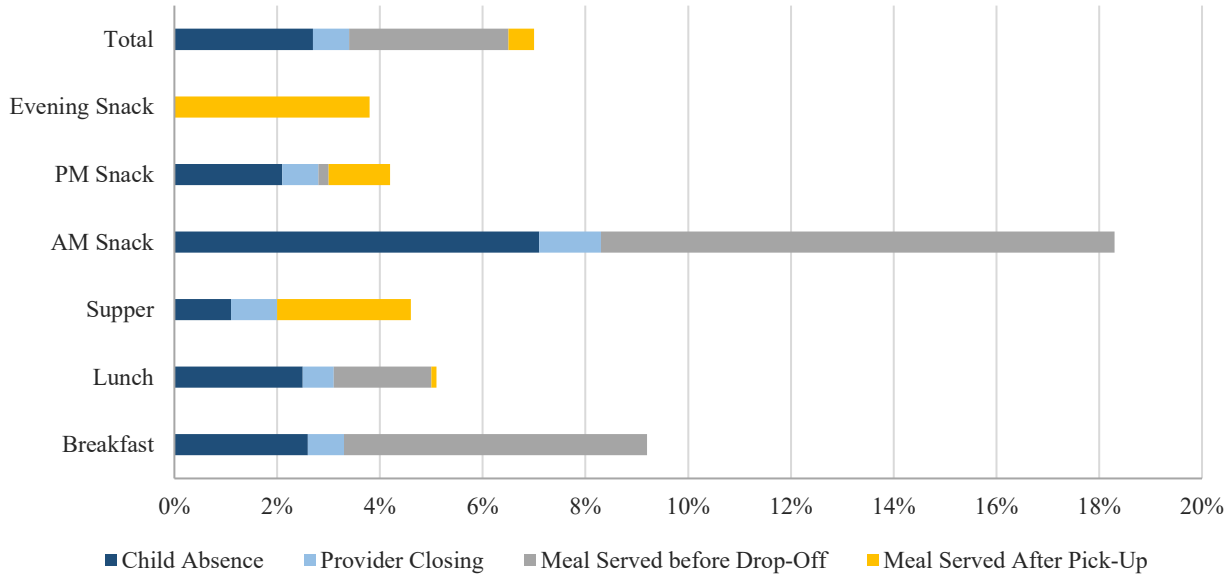
Exhibit 32. ***Estimated Overpayments Based on Child Attendance Records***

Meal Type	Dollar Value of Overpayments	Estimated Payments Based on Child Attendance	Percentage
Breakfast	$1,604.15	$7,921.61	20.3%
Lunch and Supper	$3,300.19	$18,196.46	18.1%
Snack	$1,412.30	$5,453.65	25.9%
Total	**$6,316.64**	**$31,571.72**	**20.0%**

Source: Triangulation, n=61

The advantage of this approach is that we could directly link errors with their sources because we can track the errors directly from observed data in the triangulation process. Exhibit 33 shows the cause of errors by meal type.

Exhibit 33. ***Percentage of Improper Meals Based on CARS and MSRS Reporting, by Meal Type and Error Type***



Triangulating MSRS data with administrative data (Total MSRS) generates most of the errors. Triangulation between CARS and MSRS enabled us to identify four types of errors: (1) a meal was claimed when a child was absent (Child absent as shown in Exhibit 49),(2) a meal was claimed when an FDCH was closed (Provider closed), (3) a meal was reported33s served before the child was dropped off, and (4) a meal was reported as served after the child was picked up. A meal served before a child's drop-off is a common reason for errors in claims for breakfast and AM snack. The results based on the observed data, however, are not generalizable because the sample for this feasibility study is small, not nationally representative, and tends to be affected by factors unrelated to the study, such as the hurricane that hit Austin, Texas in 2017.

5.3.2 Error Estimates Based on Difference-in-Differences Model

We calculated the improper claims based on DD regression model inferential statistics (with a 95 percent confidence interval) to yield a more reliable measure of the error. The advantages of model-generated inferential statistics include (1) representing the net estimates of improper claims generated by the intervention (controlling for the confounding factors that may have contributed to the meal claim variation); and (2) offering the range of the estimated overclaims in addition to a point estimate. However, with a small and unrepresentative study sample, the statistics would not be generalizable to any population.

We focused on overclaims in this analysis. The calculation entailed inferring the total overclaims from the model-generated mean and standard error of the DD effect. The inferred statistics included a point estimate of the total overclaims and its range derived from the 95 percent confidence interval of the mean. The range suggests the low and high range of the total overclaims that may occur with a 95 percent chance in repeated sampling.

For each meal type, we (1) multiplied the DD estimate, b_3, by the treatment group size (61 providers), to obtain the total overclaims point estimate, (2) converted the model-generated standard error into the 95 percent interval of the DD effect, and (3) multiplied the resulting low

and high values with the treatment group size to obtain the low and high total overclaims. The resulting overclaim estimates are presented in Exhibit 34.

Exhibit 34. ***Estimated Overclaims: Mean and Total Meal Counts for the Treatment Group in the Study Month (n=61)***

Meal Type	Average Overclaim	95% Confidence Level– Higher Bound	95% Confidence Level– Lower Bound	Total Overclaim	Total Overclaim Higher Bound	Total Overclaim Lower Bound
Breakfast	19.4	25.8	13.0	1,183.4	1,572.1	794.9
Lunch and Supper	25.61	34.8	16.4	1,562.21	2,121.9	1,002.9
Snacks	25.64	33.7	17.6	1,564.04	2,055.8	1,072.8

Next, we calculated dollar amounts of the overclaims by multiplying the total overclaims with the meal costs. For each meal type, we developed an average cost that was weighted by the proportion of the two tiers claimed. Applying these tier-weighted meal costs allowed relatively accurate calculation of the total dollar amounts due to overclaims. The results are shown in Exhibit 35.

Exhibit 35. ***Estimated Meal Overpayment: Mean and Total Dollar Amounts the Treatment Group in the Study Month (n=61)***

Meal Type	Tier-weighted Average Meal Cost	Total Overpayment	Total Overpayment Higher Bound	Total Overpayment Lower Bound
Breakfast	$1.17	$1,384.58	$1,839.37	$930.08
Lunch and Supper	$2.32	$3,624.33	$4,922.74	$2,326.76
Snacks	$0.62	$969.71	$1,274.61	$665.16

Finally, we computed the overclaim rates and overpayment rates for three types (Exhibits 36 and 37). The denominators were total meal served counts and total meal expenditure extracted from the administrative files of the sampled providers. Again, we presented the high and low range of both overclaim and overpayment rates. Note that the overclaim rates and the overpayment rates are almost identical, as a function of the meal costs.

Exhibit 36. ***Overclaim Rates: Overclaimed Meal Counts as Percentages of the Total Number of Meals Served (n=61 providers)***

Meal Type	Overclaim	Total Meals Served Based on Child Attendance	Overclaim Rate	Overclaim Rate – Higher Bound	Overclaim Rate – Lower Bound
Breakfast	1,183.4	6,747	17.5%	23.3%	11.8%
Lunch and Supper	1,562.2	7,850	19.9%	27.0%	12.8%
Snacks	1,564.0	8,906	17.6%	23.1%	12.0%
Total	**4,309.65**	**23,503**	**18.3%**	**24.5%**	**12.2%**

Exhibit 37. ***Overpayment Rates: Overpayment Dollar Amount as Percentage of the Total Meal Expenditure (n=61 providers)***

Meal Type	Over-payment	Total Meal Expenditure	Overpayment Rate	Overpayment Rate – Higher Bound	Overpayment Rate – Lower Bound
Breakfast	$1,384.58	$7,945	17.4%	23.2%	11.7%
Lunch and Supper	$3,624.33	$18,233	19.9%	27.0%	12.8%
Snacks	$969.70	$5,499	17.6%	23.2%	12.1%
Total	**$5,978.61**	**$31,677**	**18.9%**	**25.4%**	**12.4%**

In summary, estimates based on both observed data and DD modeling suggest potential error rates for breakfast, snacks, or lunch and supper combined are greater than 10 percent, a threshold set in IPERA as a compliance measure. The observed data show error rates that are on the high end of the error range predicted by the inferential DD model for all four meal types.

As discussed earlier, we used two approaches to estimate errors to compare results as there is no earlier work to chart our course. It helps establish the validity of the approach and the reliability of the results when both approaches produced similar error rate estimates. The specific error rates are not as informative as the directions these estimates suggest, as the purpose of this feasibility is to test the viability of data collection methods and, therefore, the sample is not nationally representative. These initial estimates are particularly useful for guiding conversations about program compliance within the CACFP community to improve program delivery and data quality in the future.

6. Recommendations

The Improper Payments Information Act of 2002 and the Improper Payments Elimination and Recovery Improvement Act of 2012 requires agencies to estimate the annual amount of improper payments in programs and report on actions to reduce improper payments that exceed $10 million. The first step is to find a method to measure improper payments that can be implemented for a limited period of time for measurement purposes without necessarily changing the behavior of making regular claims for reimbursement. This can be challenging in CACFP FDCHs, which, by their nature, are the private homes of providers and do not readily permit intervention or observation without disruption or invasion of privacy.

This feasibility study represents the third attempt by FNS to design and test a data collection method that enables FNS to estimate IP due to meals claimed improperly by FDCHs. Specifically, the study focuses on accurately measuring meals that are claimed but not served. If valid, the data collection method needs to be viable for potential national-level implementation in the future.

We designed and developed digital instruments to collect meal-serving and child attendance information from FDCH providers and parents without invasive intrusion into the routine practices at FDCHs. We used these data, in combination with secondary data already collected from sponsors, to estimate IP through an approach that yielded accurate records of meals served by providers and the children to which they were served for any given meal and day. We collected and analyzed the data in a quasi-experimental design comparing meal claims in treatment FDHCs with a control group to yield an estimate of IP.

Here, we summarize the practices and lessons learned during the feasibility study and present recommendations that could be used in a large-scale national study to measure improper meal claims in CACFP FDCHs.

The major takeaway is that the data collection methods designed for measuring IP by providers and parents are **effective and feasible for large-scale implementation** in State or nationally representative samples of sponsors and providers. In summary, we found that:

- Parents adapted readily to the use of the CARS text messages to report child drop-off and pick-up times.
  - Incentives are necessary to obtain their willingness to use the system.
  - Reminders helped parents remember to report their child's attendance.
  - The need for technical assistance was limited and occurred only in the initial use of the system.
- Providers were able to use MSRS to report meal-serving times and chose the smartphone version over the web version.
  - Incentives are essential to encourage the use of MSRS in addition to whatever existing reporting systems they are already using.
  - MSRS was effective in encouraging the timely reporting of meals served.
  - Ongoing provision of technical assistance is necessary.

In addition, it is necessary for FNS to decide how to consistently apply local and State policies and their impact on whether a claim should be considered in error or not. In the course of the

feasibility study, we found that one of the two States had more stringent requirements for the maximum number of children in care for a licensed FDCH than the other. (In some States—none in this feasibility study—local jurisdictions such as cities or counties may have licensing requirements more stringent than the State.) After consulting with FNS, we decided to treat the small number of claims affected by this provision as improper for the feasibility study.

Based on the experiences of the feasibility study, we make the following five recommendations on the process of implementation if FNS decides to conduct a nationally representative study to measure IP in FDCH meal claims.

Required v. voluntary participation: FNS decided that participation in the feasibility study would be required for sponsors and providers and stated so in recruitment materials. However, in the absence of stated consequences for lack of participation, the requirement had little impact and was treated as if it were voluntary. This may be, in part, because this was a feasibility study. In an actual large-scale or national study with a nationally representative sample, FNS should consider how it would enforce provisions for required participation. We recommend sponsors communicate this requirement to participate in FNS studies to selected providers. A contractor can provide technical assistance to sponsors to alleviate burden on sponsor's staff.

Incentives: While stating that participation is important as a message to prospective participants, behavioral science confirms that financial incentives are highly effective in gaining participation. The digital distribution of incentives in the form of an electronic gift card was effective and reliable; the contractor used dual-factor authentication to ensure secure distribution.

- There was no provision for incentives to sponsors in the feasibility study. FNS should strongly consider implementing **incentives for sponsor** participation, especially if sponsors are asked to help in the recruitment of providers. Many smaller sponsors operate with limited staff and may have challenges taking on additional responsibilities, even for a limited time. Furthermore, incentives would encourage sponsors to help in recruiting providers.
- The feasibility study provided modest **incentives for providers**—$60 for one month, which was reduced from $100 initially proposed by the contractor. The incentive amount was, at best, only modestly helpful in engaging provider participation as only 71.1 percent of providers recruited agreed to participate. A few providers even stated that they would rather quit the program than participate in the feasibility study. In the absence of enforceable consequences for their participation, no one needed to quit; there was nothing the contractor could do to gain the participation of providers who did not want to participate, and there were no consequences to providers for failure to participate.
- The feasibility study provided a $25 **incentive for parents**. The amount was modest and was probably not sufficient to gain the participation of some parents. The incentive had been reduced from $50, initially proposed by the contractor.

Onboarding: Once the contractor selects the geographic areas for an IP study and identifies a sample of providers from sponsor-provided lists, it is desirable for sponsors, along with the contractor, to be engaged in the onboarding of providers. Sponsors have an existing relationship with providers that can encourage providers to participate in the study. Similarly, providers can be engaged to facilitate the onboarding of parents along with the contractor, simply by asking parents to help them by participating in the study.

Time to prepare for study implementation: Providers and parents need time to access and familiarize themselves with using MSRS and CARS sufficiently in advance of the actual study period to begin using them. We recommend that at least one week for the majority of the providers. Consideration should be given for more than one week of advance time for providers to communicate with parents about participation.

Technical assistance: It is crucial to provide robust technical assistance during the feasibility study by offering technical assistance via telephone, email, and social media. The contractor in the feasibility study used all of these modes to communicate with providers and relied on text and telephone for parents. Parents did not need technical assistance after their initial use of CARS, but it should be available in the event of a system problem.

Appendices

Appendix 1. Reported Child Attendance in the Study Month Collected via CARS (Child n=215, days=21[26]) and Imputed Child Attendance for Days Not Reported

	Reported	Imputed[1]	Reported and imputed combined
Drop-offs, n (%)	1,935 (42.9%)	801 (17.7%)	2,736 (60.6%)
Pick-ups, n (%)	1,697 (37.6%)	937 (20.8%)	2,634 (58.3%)
Drop-off and pick-up, n (%)	1,632 (36.1%)	942 (20.9%)	2,574 (57.0%)
2nd Drop-offs, n (%)[2]	13 (0.3%)	0 (0.0%)	13 (0.3%)
2nd Pick-ups, n (%)	9 (0.2%)	4 (0.1%)	13 (0.3%)
2nd Drop-off and pick-up, n (%)	9 (0.2%)	4 (0.1%)	13 (0.3%)
Absences, n (%)	259 (5.7%)		259 (5.7%)
Closures, n (%)	252 (5.6%)		252 (5.6%)
Any action for the day, n (%)[3]			3,282 (72.7%)
Days with complete valid data, n (%)[4]			3,071 (68.0%)

[1] Drop-off and pick-up imputation applied only to children with five or more reported times for each. For both, only data for non-holiday weekdays included to compute the mean drop-off and pick-up times, respectively. Where the drop-off or pick-up time is missing, the child is not reported as absent, the provider is not reported as closed by the parent, and the day is a non-holiday weekday, the mean drop-off or pick-up for the child is used.

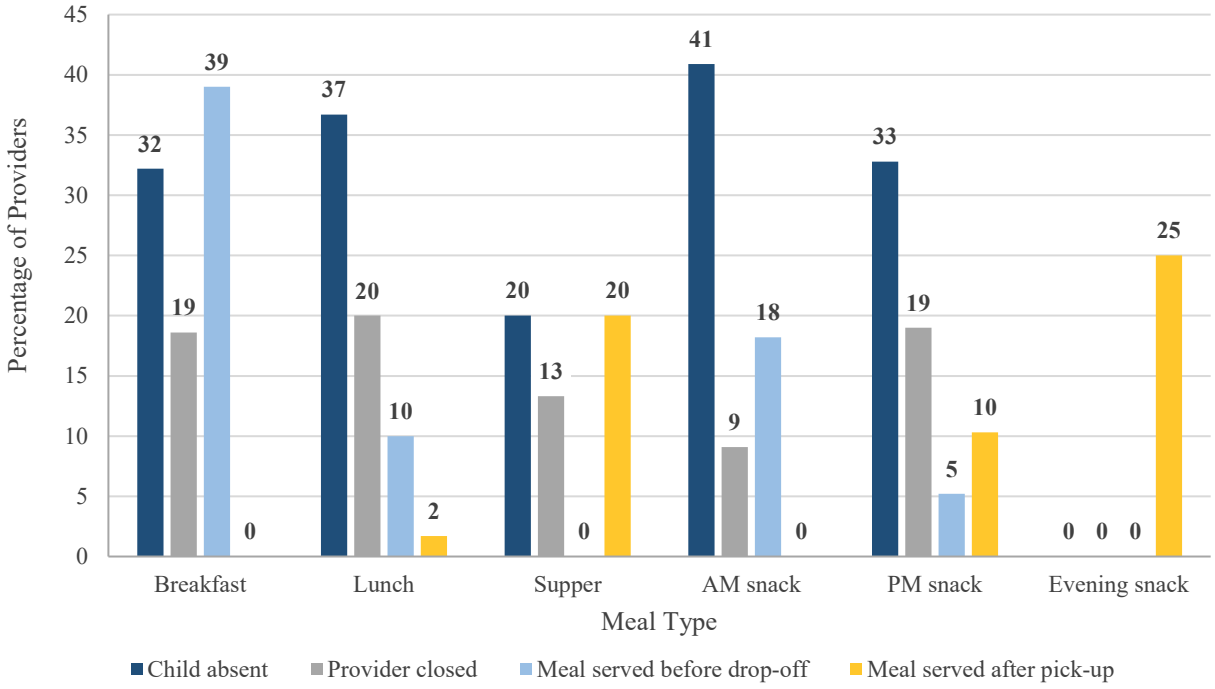
[2] Children may be dropped off and picked up multiple times per day. In the data, 13 children-days had a second drop-off and pick-up times.

[3] Action occurs if any drop-offs, pick-ups, absences, or closures included for the day, either reported or imputed.

[4] Data is complete and if drop-off and pick-up or absence or closure included for the day, either reported or imputed.

[26] When calculating the mean times, we included only children at the day care home with five or more drop-offs or pick-ups. N shows the total number of drop-offs and pick-ups these children had during the study month.

Appendix 2. Percentage of Providers with Claim Errors, by Meal Type



Appendix 3. Meal Reimbursement Rates

Meal Type	Tier 1	Tier 2
Breakfast	$1.31	$0.48
Lunch and Supper	$2.46	$1.48
Snack	$0.73	$0.20

Appendix 4. Descriptive Statistics: Average Number of Attendance Days, Eligible Meals/Snacks, and Percentages of Children by Tiering Status and Enrollment Expiration

Average attendance days of week				
N	Mean	Std. Deviation	Min	Max
644	5	0.5	1	7

Number and percentage of children with specific attendance days of week				
N of attendance days in a week	N of children	Percent	Cumulative Frequency	Cumulative Percent
Blank	2	0.31	2	0.31
1	1	0.15	3	0.46
2	1	0.15	4	0.62
3	13	2.01	17	2.63
4	7	1.08	24	3.72
5	583	90.25	607	93.96
6	20	3.10	627	97.06
7	19	2.94	646	100

Number and percentage of children eligible for breakfast				
Eligible for breakfast	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	18	2.79	18	2.79
Yes	576	89.16	594	91.95
Blank	52	8.05	646	100

Number and percentage of children eligible for lunch and/or supper				
Eligible for lunch and supper	Frequency	Percent	Cumulative Frequency	Cumulative Percent
None	3	0.46	3	0.46
Either lunch or supper	424	65.63	427	66.09
Both	171	26.47	598	92.56
Blank	48	7.43	646	100

Number and percentage of children eligible for snacks				
Eligible for snacks	**Frequency**	**Percent**	**Cumulative Frequency**	**Cumulative Percent**
One	315	48.76	315	48.76
Two	252	39.01	567	87.77
Three	33	5.11	600	92.88
Blank	46	7.12	646	100

Number and percentage of children's tier status				
Child Tier	**Frequency**	**Percent**	**Cumulative Frequency**	**Cumulative Percent**
1	11	1.70	11	1.70
2	595	92.11	606	93.81
Blank	40	6.19	646	100

Number and percentage of children's enrollment expiration				
Expiration	**Frequency**	**Percent**	**Cumulative Frequency**	**Cumulative Percent**
Not expired	598	92.57	598	92.57
Blank	48	7.43	646	100

Note: Enrollment expiration is identified as children whose enrollment expire before 10/01/2017.

Source: Child information collected from sponsors for treatment group only (Provider N=63, child N =646)

Appendix 5. Meals Claimed but Not Served

Meal Type	# of Meals That Are Reported but Not Served							Total Meals Not Served	# of Meals Claimed and Reimbursed			% Not Served but Reimbursed
	CARS				MSRS							
	Child Absent	FDCH Closed	Meal Served Before Drop-Off	Meal Served After Pick-Up	Child Absent	FDCH Closed	Meal Reported as "Not Served"		Child Attendance Served Meals	Admin Records Errors Corrected by Sponsors	Estimated Net Meals Reimbursed	
Breakfast	59	42	348	0	64	100	20	633	6,747	263	6,484	9.8%
Lunch or Supper	74	44	115	25	70	107	12	447	7,850	195	7,655	5.8%
Snack	78	45	152	75	84	103	18	555	8,906	864	8,042	6.9%
Total	**211**	**131**	**615**	**100**	**218**	**310**	**50**	**1635**	**23,503**	**1,322**	**22,181**	**7.4%**