Mobile Phone Survey

Technical Manual: Computer-assisted Telephone Interviewing (CATI) MPS Mode

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Editor's Note

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1. Introduction

1.1 Overview

Efficient monitoring and surveillance are cornerstones to track progress of disease burden, related risk factors, and policy interventions. The systematic monitoring of risk factors to generate accurate and timely data is essential for a country's ability to prioritize essential resources and make sound policy decisions.

With increasing access and use of mobile phones globally, opportunities exist to use mobile phone technology as an interim method to collect data and supplement infrequent household surveys. Such technologies have the potential to allow for efficiencies in producing timely, affordable and accurate data to monitor trends, and augment traditional health surveys with new, faster mobile phone surveys.

The Bloomberg Philanthropies Data for Health (D4H) Initiative aims to strengthen the collection and use of critical public health information. One of the components of the initiative aims to explore innovative approaches to risk factor surveillance, including the use of mobile phone surveys. The main objectives of this component are to:

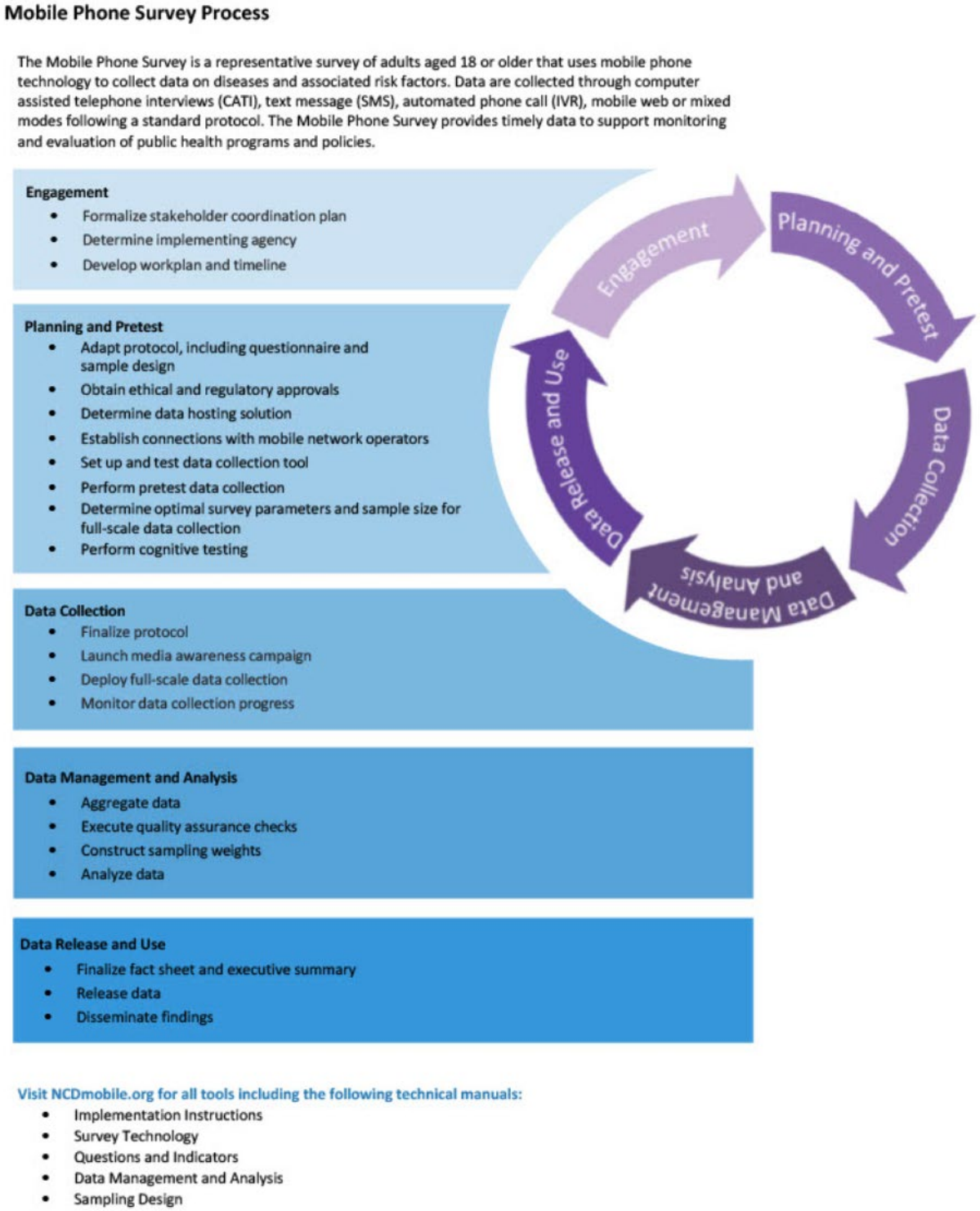
- **Empower Country Governments**: Collaborate with ministries of health to implement mobile phone technology for the systematic collection of representative health-related data, facilitating ongoing risk factor surveillance and informed public health decision-making.

- **Develop a Standardized Mobile Phone Survey Framework**: Create and promote a globally recognized mobile phone survey protocol that ensures uniformity in data collection methods, enhancing the reliability and comparability of health data across diverse populations.

- **Optimize Mobile Phone Survey Effectiveness**: Evaluate and identify best practices in the design and implementation of mobile phone surveys, ensuring they are tailored to effectively capture critical health risk factors.

The Mobile Phone Survey is a representative survey of adults 18 years of age and older. The survey uses standardized instruments and procedures reviewed and approved by international experts. This includes a core questionnaire with optional questions, sample design utilizing random digit dialing (RDD), data management procedures and data collection using single or mixed modes such as interactive voice response (IVR), short message service (SMS), mobile web and computer-assisted telephone interviewing (CATI). The implementation process consists of five stages: 1) engagement; 2) planning and pretesting; 3) data collection; 4) data management and analysis; and 5) data release and use. Details on each stage are presented in the Mobile Phone Survey Process Chart (see **Figure 1**).

Figure 1. Mobile Phone Survey Process Chart



1.2 Purpose

A telephone survey systematically collects data using phone numbers to contact potential respondents. Telephone surveys that use interactive computing systems to assist live interviewers to administer surveys are generally referred to as computer-assisted telephone interviewing (CATI). This manual provides an overview of tasks required to plan and execute a mobile phone survey using CATI. This manual focuses only on surveys via mobile phone; it does not discuss surveys via landline or fixed-line telephones.

CATI differs from IVR surveys, where respondents listen to prerecorded questions and indicate their responses by pressing numbers on the telephone keypad, and SMS surveys, which collect data via structured text messages. Because all three modes of data collection (CATI, IVR, SMS) can be conducted via mobile phones, certain aspects such as sampling and data management are similar across modes and thus will only be discussed briefly in this manual. The CATI methodology is distinctive because a live interviewer is present.

The manual covers the following aspects of CATI surveys:

- **Chapter 2** highlights questionnaire design, focusing on how designing questions for CATI surveys differs from other modes.

- **Chapter 3** discusses two options for conducting CATI surveys: in-house call centers and contracting with a third-party vendor**.** It also provides information on the various functions of CATI software.

- **Chapter 4** reviews interviewer staffing, recruitment and training.

- **Chapter 5** covers both data collection preparation and data collection, including calling rules, sample management, disposition codes and response rates and encouraging cooperation.

- **Chapter 6** reviews quality assurance.

These chapters correspond to most of the basic steps required to implement a CATI survey. As an overview, these steps are presented in **Figure 2**. To avoid redundancy with other manuals for the Mobile Phone Survey, this manual does not include two topics: sampling and data management. These topics are covered in the ***Sampling Design, Data Management and Analysis*** manual.

Figure 2. Overview of Typical Steps to Implement a CATI Survey

Sampling (see the Sampling Design, Data Management and Analysis manual)
1) Select a sampling design, including a sampling frame, and how to select mobile phone numbers and individuals. To control the release of dialed numbers throughout the field period, many CATI surveys randomly divide the numbers into replicates (e.g., subsets of 1,000 numbers) and release replicates as needed.
Questionnaire Design (Chapter 2 in manual)
2) Decide in which languages the interview will be conducted and which other materials will have to be translated (e.g., interviewer training materials). 3) Determine the length of the average questionnaire and begin to develop and format a questionnaire. Include variables necessary for weighting, for example, type of service respondents have available if dual frames are used. 4) Draft an introduction, respondent selection sequence and fallback statements to aid interviewers in tailoring introductions and gaining cooperation. 5) Evaluate the questionnaire.
Telephone Call Centers (Chapter 3 in manual)
6) If no call center is available, decide whether and how to set up one or use a vendor. 7) Review and decide upon software requirements.
Interviewer Recruitment and Training (Chapter 4 in manual)
8) Draft study-specific training materials and training guidelines for interviewers. 9) If necessary, hire staff, that is, interviewers and supervisors (accounting for language proficiency and other factors). Schedule training and data collection sessions. 10) Train interviewers and supervisors.
Data Collection Preparation and Execution (Chapter 5 in manual)
11) Determine the length of the field period and "calling rules," including time and day of the calls, maximum number of call attempts per mobile phone number, time between contact attempts, use of refusal conversion attempts and adjustment of disposition codes to meet study requirements. 12) Identify performance indicators and establish monitoring routines. 13) Using CATI software or spreadsheets, create a call-record template that tracks and controls all call-related information for each contact attempt. 14) Decide upon use of incentives and potential reimbursement of cell-phone respondents for their minutes used. 15) Pilot test and revise the survey procedures, and all materials including the questionnaire and training materials. 16) Program the script and calling rules into CATI. Pilot test the CATI script. 17) Conduct fully supervised training interviews. 18) Conduct main interviews.
Quality Assurance (Chapter 6 in manual)
19) Monitor key performance indicators during data collection. 20) Monitor interviewers during data collection and retrain if necessary.
Data Management (see Sampling Design, Data Management and Analysis Manual)

21) Edit/code completed questionnaires. If necessary, train and monitor coders for open-ended questions.
22) Assign weights to account for unequal probabilities of selection, nonresponse, etc.
23) Perform data analyses and prepare a report.

Adapted from Lavrakas (2010, p. 492)

2. Questionnaire Design

When developing questions for CATI surveys, countries should follow basic principles of questionnaire design—such as question wording, number of response options, scale construction and order effects. Countries should also be mindful of how to design questions for mobile phone surveys in various modes (e.g., SMS, IVR and CATI). Some issues, however, are specific to CATI because this mode involves voice communication between an interviewer and respondent. This chapter describes those issues. See the ***Questions and Indicators Manual*** for additional details on questionnaire design for mobile phone surveys.

2.1 Ensure Standardization

To ensure standardization, CATI screens must clearly indicate what material interviewers must read to the respondents, what is optional, and what should not be read to the respondent. Unless used across different modes, CATI screens often use different fonts or brackets to help identify these different elements. Whichever rules call centers decide to implement, they should be uniform across all CATI surveys to avoid interviewer confusion. Here are some sample rules that countries could consider using:

- Use lower case for text that the interviewer should read to the respondent.
- Use CAPITAL LETTERS in combination with parentheses for interviewer instructions. Interviewers should follow the instructions but should not read them to the respondent.
- Use bold-face fonts to emphasize certain words.
- Treat information enclosed in parentheses as optional. Interviewers can read this text to respondents if they think it will help respondents.

The screen should also include separate interviewer instructions when necessary and contain conversational cues and scripted transition statements to facilitate standardization.

Avoid abbreviations like “his/her” and special characters. Include pronunciations for difficult words or place names. This convention ensures standardization, as typically interviewers vary in how they read abbreviations. See **Figure 3** for an example of a CATI survey question.

This example provides information on the variable name (DIET1), question text, valid values (0–7, and #) and skip logic. Notice that all information to be read to the respondent is in lower case whereas everything else is in all capital letters. This example shows just one method of writing

CATI questions. Other methods of documenting questionnaire specifications are equally valid, and each country should develop clear, standardized methods as they see fit.

Figure 3. Example of CATI Survey Question

DIET1. With the next questions, I would like to learn more about the foods that you eat. In a typical week, on how many days do you eat fruit such as apples or bananas?
____ (INTERVIEWER: ENTER A NUMBER FROM 0–7)
DON'T KNOW
REFUSED
<By fruit we mean a usually sweet food that grows on a tree or bush, such as a banana, orange, or apple.>
[PROGRAMMER: IF 0, GO TO DIET3. ELSE GO TO DIET2.]

2.2 Allow "Don't Know" and "Refused"

CATI systems should allow for "refused" and "don't know" options for every question. If the CATI system does not allow for these options, interviewers will have to continue to probe for a response and might frustrate respondents, risking breakoff. In addition, interviewers who do not have the "refused" and "don't know" options may steer respondents toward a particular response, leading to error. In many CATI surveys, interviewers do not read the "refused" and "don't know" options to respondents, but respondents can select a "refused" or "don't know" response if they desire.

2.3 Enhance Interviewer Usability

CATI screens should facilitate interviewers' work and reduce error. To increase efficiency and avoid clutter, typically only one question is presented per CATI screen. However, evidence suggests that multipart questions should be presented on a single screen (Edwards et al., 2008).

2.4 Write Clear and Persuasive Introductions

Most CATI studies are based on cold calling, where the interviewer has not had a previous interaction with a potential respondent. Hence, CATI surveys need to provide a short, clear and persuasive introduction to the survey (Dillman et al., 2014). This rule is true for SMS and IVR surveys as well, but introductions in CATI can be longer with more persuasive messages than introductions in SMS and IVR (which are necessarily short). The introduction should:

- Contain information that is compliant with local legal and ethical guidelines.

- Sound smooth and natural (Lavrakas, 2010).
- Include an identification of the interviewer, including name and affiliation, and the survey sponsor.
- Explain the survey purpose and target population.
- State that the survey is confidential and voluntary.
- Include the expected duration of the survey and a statement of the benefits of participation to encourage cooperation.
- Verify the mobile phone number dialed if the phone number is dialed manually.

3. Telephone Call Centers

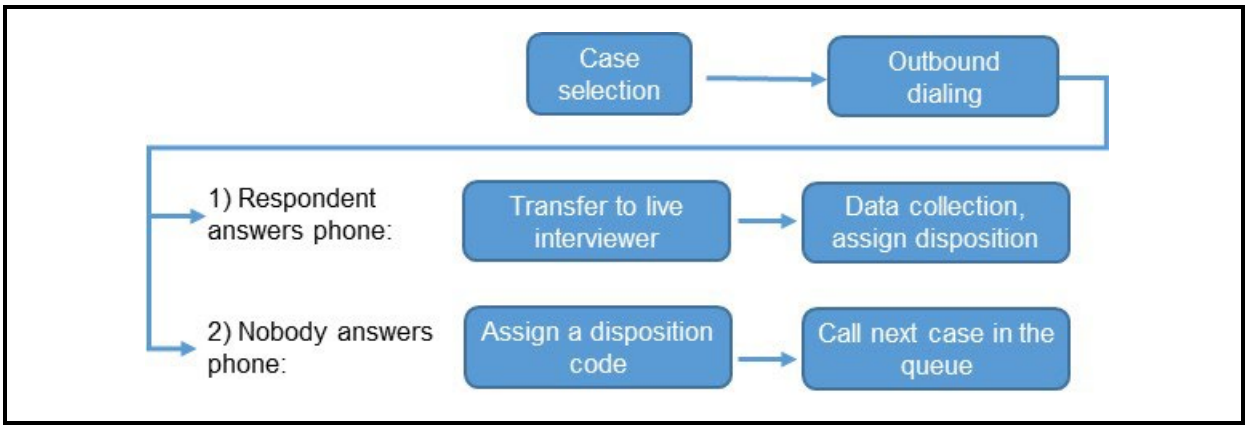
The heart of most CATI surveys is a physical call center with interactive software that guides the interactions between interviewers and respondents. This chapter reviews the main components of CATI computing systems (sample and case management; calling rules; questionnaire; reporting; data import/export). This high-level description sets the stage for subsequent chapters, which have more detail on how CATI systems are used for data collection (Chapter 5) and quality assurance (Chapter 6).

Some countries may already have a call center, either housed within the Ministry of Health or another government body such as a national statistical agency. Other countries may not have access to a government call center. For countries without call centers, this chapter outlines two options for conducting CATI surveys: (1) setting up a new call center and (2) working with CATI vendors and setting up a virtual call center. Each approach has advantages and disadvantages, which are described below.

3.1 CATI Systems

CATI systems must undergo and complete several steps to collect data (see **Figure 4**). First, the CATI system selects the next case to be worked into the queue. The system dials the number. If someone answers the phone, the call is automatically transferred to a live interviewer who will begin data collection. If no one answers the phone, the system automatically assigns a disposition code and records it in the case management file. The CATI system then loads the next case in the queue and returns the case to the queue. Through this process, the CATI system assigns disposition codes that track the status of each case (e.g., completed interview, breakoff, no answer).

Figure 4. CATI Systems



To complete those steps, CATI software needs to have the following capabilities: (1) sample and case management; (2) calling rules; (3) questionnaire; (4) reporting; and (5) data import/export.

3.1.1 Sample and Case Management

The sample and associated case input data are loaded into the CATI sample and case management system. This system is used to release batches of the sample to the field, maintain the sample status of each case, and optimize call scheduling. Ideally, the sample management system can assign cases for interviewers to call; record date, time, and disposition code for each attempt (use call tracking forms if numbers are manually dialed); and support monitoring and performance evaluations. Optimal, flexible call scheduling of contacts helps to maximize response rates and minimize costs (Hansen, 2008).

The key components of CATI sample management systems include (Hansen, 2008, p. 346):

- **Interviewer functions.** Typically, interviewer interfaces either allow interviewers to select cases to work or use automated call schedulers (see below) that assign cases to interviewers. To make an informed call and know the contact history, the interface should provide interviewers with information on previous contact attempts for each case to be worked (case and contact notes) and allow interviewers to record new information on the call attempt.
- **Supervisory and management functions**. Call centers need to be able to control the calling rules specified below.
- **Dialers**. Auto-dialers dial the mobile phone number automatically, which saves time because interviewers do not have manually dial numbers (and potentially misdial numbers). Autodialing is typically included in most call scheduling systems. Dialers also include a predictive or a nonpredictive component. In a predictive dialer, the CATI system automatically calls telephone numbers. Once a respondent picks up the phone, the CATI system automatically transfers the case to an interviewer. This method is efficient because it minimizes interviewer downtime, but can also lead to situations where a call is connected but an interviewer is not available. Figure 4 above represents a

predictive dialer. Conversely, in nonpredictive dialers, the interviewer initiates the call and listens to the call being dialed. If no one picks up, the interviewer continues to the next case. Nonpredictive dialers are less efficient, but eliminate situations where a call is connected but an interviewer is not available.

- **Automated call schedulers.** They rely on automated protocols to manage the handling of calls to cases. They control delivery of cases across surveys and interviewers and also control hard appointments. They typically also allow for an optimal manual selection of cases. Call schedulers usually adjust for time zone so that respondents are not called in the middle of the night if the call center is in a different time zone. They also assign disposition codes that can be automatically determined, such as busy signals.
- **Interviewer assignments.** It may offer the ability to assign interviewers based on interviewer attributes such as experience, sex or language.
- **Disposition code assignments.** It may offer automatic assignment of final disposition codes after the maximum number of call attempts.
- **Monitoring and reporting systems.** To obtain high-quality data and control cost, staff should be supervised and managed in addition to the sample. This step includes status reports on all cases in a sample, interviewer-level productivity and performance, cost control reports, as well as diagnostic reports on trends, outliers or missed appointments (Hansen, 2008).
- **Strata definition and monitoring.** CATI systems should give countries the option of defining strata of interest (e.g., age and sex groups). Systems should also allow CATI managers to monitor the number of completed interviews for each strata. If a particular stratum is full (i.e., the desired number of interviews for the stratum has been achieved), interviewers are instructed to inform members of that particular stratum that the survey has closed. For example, if a stratum of men 18-24 years old is full, an interviewer speaking with a 22-year-old male respondent obtains any remaining necessary responses, such as demographics or questions related to sample design. The interviewer then informs the respondent that the quota has been filled, thanks the respondent for his interest and ends the interview.

Sample management systems sometimes also contain information about which telephone numbers will be randomly selected for quality assurance (e.g., a supervisor listening to the call live or listening to the audio-recorded interview afterwards). See Chapter 6 for more information on quality assurance.

3.1.2 Calling Rules

CATI software allows countries to specify when calls are made. Often individuals in the sample must be called multiple times. Thus, calling rules are developed for standardization. Calling rules use the outcome of previous dials (and, in some cases, other data) to determine whether the case should be called back and, if so, when (for a more detailed discussion of calling procedures, see Chapter 7). In some software packages, one may be limited to using the current dial's outcome (e.g., ring-no-answer, voice mail, or completed interview) and call counter (i.e.,

how many dials have already been placed) in rule construction. Other packages have no limitations; one may use the entire call history, frame information, response data or other paradata to create calling rules.

3.1.3 Questionnaire

The questionnaire is the largest, most evident part of CATI software. The survey questions are programmed and appear in this piece of the software. Different packages come with different features. For example, some packages are programmed using a computer language and coding whereas others may use a point-and-click method. Programming using computer languages usually offers more flexibility and control and tends to be faster whereas the point-and-click interfaces are more user-friendly to nonprogrammers. Packages also vary on the questionnaire interface such as the flexibility of the screen layout, formatting, ability to create questionnaire loops or the ability to program complex skip logic.

3.1.4 Monitoring Data Collection

The CATI call center will need to monitor data collection to ensure appropriate interviewer staffing, determine whether sample yields are on target, and ensure quality control. Some CATI software offers user-friendly interfaces that can show the live status of the sample (such as the number of interviews completed), the distribution of call outcomes (such as the number of refusals), and number of cases scheduled for dialing (see Chapter 6 on quality assurance for additional detail). An important task during data collection is to carefully monitor the progress of strata (e.g., age and sex subgroups of interest specified in the sample design). The CATI software should have a mechanism to monitor the number of completed interviews per stratum, as well as a mechanism for screening out respondents who belong to strata whose targets have already been met.

3.1.5 Data Import and Export

The final factor to consider when choosing a CATI software package is the data import and export functionality. In most standard systems, a sample file is manually loaded to the CATI system. The file must be correctly formatted, or it may be rejected. Standard CATI systems also support exporting of data in a simple format such as a CSV file. More advanced systems may allow different file formats and may autocorrect some common errors in the file during the data import process (e.g., duplicate or incomplete telephone numbers). Advanced systems also provide more sophisticated data export functions, such as exporting in a format suitable for statistical software packages (e.g., data files with variable and/or value labels). These advanced systems reduce effort in preparing data files but are not necessary to execute a basic CATI survey.

3.2 Setting up a Call Center

Countries that anticipate conducting CATI surveys over the long term may wish to set up their own CATI call center. A new center could be built from scratch, or an existing call center could be reconfigured and used for purposes other than surveillance (e.g., a hotline that handles inbound calls about health services). Setting up a call center is a considerable investment in CATI software (described above) and staff (see Chapter 6). It also requires space and hardware, described below.

3.2.1 Space

Call centers require various types of space, including a large open floor plan for interviewer work stations, supervisor stations, offices, training and/or conference rooms, breakrooms, server rooms and bathroom facilities. The size of the space will vary, but one rule of thumb is 14 to 21 square meters per workstation plus room for the other types of office space (Kelly et al., 2008). There should be enough workstations for every interviewer working at peak calling time.

In addition to size, consideration should also be given to other building features. The space should minimize background noise with good acoustics, insulation from outside noise, and carpeting. It should also be climate controlled to ensure that hardware does not overheat and interviewers are comfortable. Finally, building access must be secure but flexible to shift work. Many interviewers may arrive/depart at the same time. Security should be able to efficiently and effectively get them into the building with minimal wait time.

3.2.2 Hardware

Three categories of hardware are needed for any call center. First, a call center must have a dialer. The dialer manages all calls across interviewers. It determines which cases get called and when, assigns cases to interviewers, and prevents multiple interviewers from dialing the same case at the same time. The cost of a dialer varies significantly from a $50 per month license to $100,000 depending on additional features (e.g., autodialing), capacity (i.e., the number of interviewers that can be logged in at once), CATI software, and the type of dialer (e.g., predictive vs. nonpredictive).

Second, each interviewer workstation should be outfitted with a computer, landline or voice-over IP (VOIP) telephone and headset.

Finally, the building must be equipped with stable, high-speed transmission capabilities for both the telephone lines and Internet. Workstation computers need a permanent connection to both the dialer and servers where the data are stored. Servers may or may not be stored in the same location as the call center. Housing servers onsite provides faster transmission of data. However, stricter security is typically available offsite. Web-based CATI systems also need an

Internet connection to progress through the interview. Without stable and high-speed connectivity, respondents may become frustrated with lags between questions, and data may not be stored correctly.

3.3 Working with CATI Vendors (Virtual Call Centers)

Countries that choose not to set up a call center could also contract with a vendor that specializes in telephone surveys. Working with CATI vendors offers advantages but also entails challenges (see **Table 1)**. See Dabalen et al. (2016, p. 45) for additional considerations.

Table 1. Advantages and Disadvantages of Working with CATI Vendors Compared with Setting Up a Call Center

Advantages	Rationale
Less expensive in short run	Setting up new call center requires considerable investment. Countries may not be prepared for such an investment, especially if quality of CATI data is not well established.
Preferred option when need for CATI surveys is sporadic	Maintaining call center staff and infrastructure may not be cost effective if countries anticipate only periodic or low volume of CATI surveys.
Can rely on vendor expertise and experience	Countries can benefit from CATI vendors' specialized knowledge from diverse projects.
Disadvantages	**Rationale**
Additional administrative work	Coordinating with an organization outside of the government requires additional administrative and legal effort (e.g., vetting vendors, subcontracting).
Requires close oversight of training and data collection to ensure quality	Some CATI vendors may be accustomed to different quality standards (e.g., market research). In these situations, countries may wish to exercise close oversight of vendor's work.
Data security and respondent privacy	To avoid risk of disclosure of respondent information, countries will need to ensure that vendors store and transmit data securely.

There are different types of CATI vendors. Some vendors are private-sector firms that conduct only CATI surveys. Larger research agencies may conduct CATI surveys in addition to face-to-face surveys. Universities may also maintain call centers.

Before beginning a formal tendering process, it is advisable to conduct a landscaping exercise to identify possible CATI vendors. During this landscaping exercise, countries may wish to ask questions shown in **Figure 5**.

Answers to these questions can help the country understand the vendors' capacity for high-quality CATI surveys. After this landscaping exercise, countries could issue an open tender (e.g., release a public request for proposals and accept bids from any interested party) or invite a selected number of CATI vendors to bid on the project. The tender would require a Statement of Work (SOW) that details all responsibilities of the CATI vendor. It may be helpful to organize the SOW around the following tasks: (1) management, (2) sampling, (3) questionnaire development and programming, (4) training, (5) data collection, (6) data management and (7) reporting. Countries would then receive proposals from CATI vendors and conduct a technical and financial evaluation of each proposal.

Figure 5. Sample Questions to Ask CATI Vendors

- **CATI Experience:** How many years have you conducted CATI surveys? What are three studies that you have conducted in the past five years that demonstrate your experience? How many CATI surveys have you conducted in the past 12 months? Have you worked with government or nongovernmental organization (NGO) clients?
- **Infrastructure:** What CATI software do you use? How many CATI seats do you have? Of those seats, how many are active? What type of computers do you use? What dialers are used (e.g., autodialer versus manual dialing, predictive versus nonpredictive)? How do you manage cases? What disposition codes are standard in your CATI system?
- **Questionnaire:** What is your process for translation? What capabilities does your questionnaire software have? How long does it take to program a 20-minute survey?
- **Sampling:** What sampling methods have you used? Have you ever conducted a random-digit dial (RDD) survey? Or have your clients always provided a database of telephone numbers?
- **Interviewers:** How many interviewers do you typically have working on projects at one time? How are new interviewers trained (describe the training process)? Are refresher trainings done for existing interviewers? What is the average tenure of interviewers? What are the educational and work qualifications of your interviewers? What is the language profile for your interviewers?
- **Data Collection:** How many call attempts do you make for each case? What days of the week and times of day do you conduct interviews? Do you suggest offering an incentive to encourage participation, and if so, how much? How do you conduct quality assurance? How do you assign cases to interviewers?
- **Data Quality Control:** What protocols are in place to ensure data quality and validity? How is data collection monitored? Are data checks a part of the data management process, and if so, how are these conducted?
- **Data Security and Ethics:** What are your protocols for storing data securely? Do you have an institutional review board (IRB)?

4. Interviewer Recruitment and Training

CATI surveys require staff to run the call center. Although interviewers are the most prominent staff in a CATI survey, other staff play important roles, including call center managers,

supervisors, quality control staff and principal investigators in the country to manage the call center. Kelly et al. (2008) thoroughly discusses the roles and responsibilities of each position. This chapter focuses on interviewers because they play the most critical role in data collection. Interviewers contact and recruit respondents, ensure cooperation and establish a relationship with respondents, ask questions, and record responses (Fowler and Mangione, 1990). Hence, interviewers can have a potentially strong influence on response rates, the types of respondents who choose to participate, and the quality of measurement. Individual interviewers can introduce bias and variance due to their personal attributes and the way they ask questions. Countries can mitigate these so-called "interviewer effects" through appropriate recruitment and training protocols (Fowler and Mangione, 1990; Groves, 2004).

4.1 Staffing and Recruitment

Interviewers are typically scheduled in 4- to 6-hour shifts. When determining the number of interviewers to staff at any given time, managers should consider:

- Length of the interview
- Sample size and number of telephone numbers to be dialed
- Estimated response rate and the types of numbers to be dialed (e.g., appointments or new sample)
- Number of call stations and dialer efficiency
- Time of day and day of week
- Duration of data collection
- Number of calls expected or desired per day

Staffing too few interviewers will result in a backlog, and too many interviewers will result in idle time, driving up labor costs. Importantly, call centers should generally hire enough interviewers such that no interviewer conducts more than 5 to 10% of completed interviews. This rule mitigates the possibility that any interviewer exerts undue influence on the survey estimates because of how she administers the survey. Typically call centers hire enough interviewers to allow for interviewer attrition and absenteeism.

At any given time of day, the interviewer pool should be a mix of experienced and new interviewers as well as balanced by type of interviewer (e.g., interviewers specifically trained to communicate with selected individuals who refuse to participate [refusal converters] or bilingual interviewers). This approach smooths production.

In addition to interviewers, supervisors are also scheduled in shifts. In general, one supervisor should be scheduled for every 8 to 10 interviewers. In addition to working time, interviewer

breaks are also typically scheduled and staggered to minimize large upticks and downticks in the number of dials made per hour (a phenomenon that reduces dialing efficiency).

Countries will need to decide how to pay interviewers. There are typically two forms of payment: payment per completed interview or payment by hour (Pennell et al., 2010). In many call centers, interviewers are typically paid per interview. Empirical evidence suggests that this pay scheme leads to greater productivity—that is, a significant increase in the average number of completes per hour and a significant decrease in the average number of dialed calls per completed interview (Cantave et al., 2009). It is also easier to monitor and control interviewer costs using payment per interview. On the other hand, payment based on an hourly rate ensures that interviewers do not focus only on cooperative respondents while neglecting harder-to-persuade individuals (Pennell et al., 2010).

Call centers should recruit types of interviewers who represent local cultural and linguistic groups. To reduce bias, or depending on the culture and the topic of the study, some situations may require a matching of interviewer and respondent characteristics by sex, dialect, language, caste, age, etc. Without auxiliary information from the frame or prior screening interviews, matching may be difficult to achieve. Before recruiting begins, feasibility assessments should be conducted to determine the number of languages spoken in surveyed regions. Call centers should have procedural guidelines in place as to how to advertise the position and how to select candidates (Pennell et al., 2010). Call centers can communicate with local contacts for suggestions, post flyers and advertise in local papers and online to recruit interviewers. To reduce interviewer attrition, all position requirements should be described clearly, and cultural norms should be followed during the hiring process. Countries should document the entire recruitment and application process, including how evaluations such as reading/writing fluency, language skills, and educational level or computer skills were assessed. When they are hired, all interviewers should sign a written nondisclosure agreement to maintain respondents' confidentiality.

4.2 Interviewer Training

The goal of interviewer training is to improve data quality and standardize data collection. Standardized interviewing is the gold standard to avoid potentially biasing influences of interviewers (Fowler and Mangione, 1990). Standardized interviewing techniques require interviewers to read the questions exactly as worded, to use nondirective probing, to accurately record answers, and for interviewers to communicate in a neutral, nonjudgmental stance. It is essential that all interviewers be trained consistently to comply with these requirements.

Interviewer training usually involves a general training and a study-specific training. Call centers should allow for enough training time prior to the survey and increase training time for complex surveys.

General interviewer classroom training should include the following:

- An overview of the survey research organization, the role of the interviewer and supervisors in the organization and research process
- An explanation of how to identify sample members including managing cases, selecting individuals and securing respondent participation
- General telephone interviewing techniques (read questions exactly as worded, record answers exactly as given, use controlled speaking pace and voice, provide encouragement and targeted feedback [Fowler and Mangione, 1990])
- An introduction to CATI hardware and software
- A discussion of performance indicators, monitoring standards, expectations on quality, productivity and interviewer evaluations and potential follow-up trainings
- A discussion of ethical considerations
- Particulars regarding the employment itself and administrative issues

Training should consist of a combination of lecture style, plenary sessions including examples (e.g., audio-recorded interviews), visuals and group-practice sessions with simulated interviews and role playing (Alcser et al., 2016). A written test or a supervised (scripted) practice interview with evaluation and feedback, using audio taping or observational measures is strongly recommended after the training is over (Fowler and Mangione, 1990). Depending on the level of prior interviewing experience, general interviewer training usually extends over several days (e.g., three to five days [Dillman et al., 2014]). Once the general training is complete, novice telephone interviewers typically spend several days shadowing more experienced interviewers.

Study-specific training should:

- Explain the general purpose of the study.
- Review the sampling design, how mobile phone numbers were selected and implications for the interviewing task
- Explain specifics of the survey introduction and respondent selection, review study-specific refusal avoidance strategies and fallback statements to gain cooperation
- Include an item-by-item explanation of the questionnaire
- Review probing conventions, how to avoid influencing or biasing responses and the software and data entry procedures

A study-specific guide (e.g., manuals, questionnaires, FAQs) addressing these issues should be provided to interviewers. Role-playing opportunities and one-on-one mock interviews should be built into the interviewer training. As part of training, interviewers should conduct at least 10 interviews with actual cases that are subsampled from the sampling pool. These practice cases are important to give interviewers real-world experience in recruiting respondents and administering interviews. These cases, however, should be kept separate from the main data

collection used in the final analysis (Lavrakas, 1993). Supervisors should provide regular follow-up trainings and timely feedback to the interviewers (Dilllman et al., 2014).

Additional types of training include refusal avoidance to improve interviewers' skills in obtaining cooperation and countering nonresponse, both at the individual and the item level (Groves and Couper, 1998). Quality assurance and monitoring processes (see Chapter 6) help supervisors decide which individual interviewer or groups of interviewers to train for refusal avoidance and which interviewers to retrain.

Generally, interviewers and supervisors should have regular debriefings or some form of exchange to address issues and questions that arise during data collection.

5. Data Collection

This chapter discusses three key aspects of collecting data using CATI:

1. Calling procedures
2. Using disposition codes and response rates
3. Encouraging cooperation

5.1 Calling Procedures

CATI surveys must establish calling rules and procedures to complete the survey on time, within budget and with an acceptable response rate. Best practices, IRB requirements and local legal restrictions should be considered when developing calling rules. For example, while most countries permit surveys conducted on behalf of local governments to use auto dialers to dial mobile phone numbers, auto dialers may not be permitted for surveys conducted on behalf of other sponsors. Most importantly, countries should carefully evaluate the implications of Do Not Call registries (if those exist) for calling procedures. Finally, countries also need to familiarize themselves with the cost structure of telephone calls to understand the costs respondents may incur for receiving telephone calls.

Call centers will need to make the following decisions about when and how often to contact sampled mobile phone numbers (Dillman et al., 2014):

- The length of the field period, which could range from only a few days to months. Typically, longer field periods increase response rates (Holbrook et al., 2008).
- The (maximum) number of contact attempts per sampled mobile phone number. Most surveys calling mobile phones cap the number of dials at three to eight to optimize the probability of contact and respondent burden.

- How to vary the days and times between call attempts. Call schedulers should vary the time, day, and length between call attempts. A good rule of thumb is to schedule dials on different days of the week to maximize the probability of contact for each case. For soft refusals a cooling-off period of at least a week to 14 days is recommended.
- Times of the day to begin and end interviewing. To maximize the probability of contact, call attempts should also vary the times of the day for each case. The best time to call varies depending on the population of interest.
- Days of the week for data collection. Countries should heed local customs about calls on or around holidays, especially religious periods.
- How mobile phone numbers will be dialed, that is, whether to use auto dialers or manual dialing.
- How to determine the size of batches of sample release and how those should be released to the field.
- How to implement a system to track every call attempt, disposition codes and sample member using a unique ID—that is, using an automatic tracking form or having interviewers manually record the information in a call sheet.
- What to display on caller ID.
- Whether and what to leave as a voice mail message (if voice mail is common in the country).
- Whether to use refusal conversion and how long to wait between calls.
- How to handle inbound calls.

5.2 Disposition Codes and Response Rates

Disposition codes record the outcome of a call and are assigned either automatically by the CATI system or by the interviewer. These codes inform the sample management system whether and when to call the mobile phone number again or not to call again, for example, when reaching a business number in a general population survey. Disposition codes are also used during the data collection phase to monitor sample performance. See the ***Sampling Design, Data Management and Analysis Manual*** definitions of case dispositions for RDD surveys from the American Association for Public Opinion Research (2016).

5.3 Ensuring Cooperation

In standardized CATI interviewing, interviewers are trained to read the questions exactly as worded, in the order they appear in the questionnaire, to probe indirectly, to provide encouragement and targeted feedback, and to record the responses exactly as the respondent answered (Fowler and Mangione, 1990; Dillman et al., 2014). The interaction between the

interviewer and the respondent then typically consists of the paradigmatic 'question-answer-neutral acknowledgement' sequence. Given the more conversational tone of CATI interviews, questions need to be scripted appropriately to maintain this sequence (i.e., not interrupt it and potentially contribute to measurement error). This process includes careful scripting of the different elements of the CATI survey administration, including survey introductions, respondent selection sequence, fallback statements, transition statements, instructions, definitions and clarifications. Interviewers must focus on the respondent and practice active listening to be able to quickly decide how to react to any questions or comments the respondent raises (Dillman et al., 2014). Interviewers should control their speaking pace and voice, including pitch and tone (Dillman et al., 2014). Interviewers and supervisors should have regular debriefings to discuss (recurring) issues that arise and potentially revise scripts (see also Chapter 6).

Incentives can be effective means to increase response rates in telephone surveys, potentially reducing nonresponse bias and the number of contact attempts. Incentives in telephone surveys can lead to a reduction in overall survey cost because they increase response rates and reduce the number of contacts needed to successfully interview a case, with no negative impact on data quality (e.g., Singer and Ye, 2013; Medway and Tourangeau, 2015). Incentives are either prepaid/unconditional at survey completion or promised/conditional upon survey completion; they can be monetary or nonmonetary. Examples of incentives include mobile phone airtime automatically applied to the respondent's mobile phone, lotteries (usually with a higher monetary value), vouchers or other gifts. Depending on the local environment, countries need to fully cover airtime charges that respondents incur when answering mobile phone surveys. It is advisable to conduct pretests on the effectiveness of incentives.

Refusal conversion protocols can sometimes be an effective tool to combat nonresponse bias and help to increase response rates (Groves et al., 2004; Hansen, 2008). Disposition codes for so-called soft-refusals, including additional information on the contact, need to be in place to allow for a refusal conversion, usually done by a specifically trained interviewer after a minimum of a one- to two-week waiting period (Dillman et al., 2014). Countries should, however, remember that although refusal avoidance attempts might reduce nonresponse error, they might increase measurement error and potentially increase survey costs. For example, if an interviewer makes great efforts to get a reluctant respondent on the phone (minimizing nonresponse error), that respondent may provide poor quality data during the interview (increasing measurement error).

6. Quality Assurance

Countries should engage in two types of quality assurance to ensure that CATI surveys produce high-quality data: (1) **process quality assurance**, which measures internal procedures to collect data such as interviewer productivity and how many more calls must be made; and (2) **interview**

administration quality, which refers to how well interviewers faithfully adhere to procedures while conducting interviews with respondents.

6.1 Process Quality Assurance

The process of administering CATI surveys must be tracked on an ongoing basis to monitor the CATI survey's logistics, finances and schedule. **Table 2** lists the six major categories of process quality assurance, along with sample indicators. See Jans et al. (2013, p. 196) for additional details on these categories.

Table 2. Process Quality Assurance for CATI Surveys

Category	Description
Data Collection Effort	The expenditure of resources during data collection (e.g., interviewing hours, incentives, overhead).
Staff Productivity	The number of completed cases divided by hours worked, to identify interviewers with low productivity and interviewers with higher productivity. Other measures include call attempts per hour, hours per complete, interviewer-level response rates, refusals by hour and ineligibles by hour.
Status of Active Sample	The number of sampled cases that have yet to be called, which sheds light on the remaining length of data collection. CATI managers track status of active sample by monitoring call records and disposition codes daily. These indicators include, for example, the number of appointments and the number of cases with a high number of calls (e.g., 8+ calls).
Survey Output	The number of completed interviews per day and the number of missing responses on outcome variables of interest.
Measurement Process Quality	Known as "micro data quality," this category includes an assessment of the average rate of respondent-level item nonresponse, interview durations, and interviewing pace to detect possible falsification. Also includes monitoring of skip patterns.

Countries should evaluate the process of CATI surveys daily. Many CATI software packages have dashboards or trend reports to help CATI managers assess the process quality (Hansen, 2008). For example, interviewers with interview durations that are consistently too short could be flagged for special monitoring and potential retraining.

6.2 Interviewer Monitoring

The audio from all CATI interviews should be recorded, allowing managers to listen to the complete interview, including the survey introduction and closing. This high level of involvement is a major advantage of CATI compared with face-to-face surveys, where managers in the central survey office have a limited view into the reality on the ground. To take advantage of this capability, countries should follow these steps.

First, have an auditor listen to 15% of all completed surveys and 25% of all surveys that had a refusal. The cases selected for quality review should be randomly sampled within each interviewer to ensure an adequate number of cases for each interviewer.

Second, score the interviewer's performance using standardized protocols. Key components of a standardized interviewer monitoring form should include an assessment of how interviewers read questions, the use of nondirective probing and data entry errors, although this may need to be adapted to the specific data collection needs (Fowler and Mangione, 1990, p. 125; see also Appendix 19A in Steve et al., 2008). A scoring procedure will then help to summarize interviewer performance (Steve et al., 2008). Although supervisors do not need to monitor entire interviews, they should apportion their time across all interviewers, especially those new to interviewing. The results of the auditor's review should be communicated to the interviewer within 24 hours, and the interviewer should receive additional training to correct any errors. Use follow-up trainings to increase interviewer performance and to detect inappropriate behavior early on. Interviewers who do not meet the performance criteria despite all efforts need to ultimately be released from the data collection effort.

Third, in addition to reviewing interviews that occurred in the past, supervisors based in the CATI center should also listen to live interviews in progress (known as "intrusion"). Listening to live interviews allows the supervisor to address any quality issues during the survey interaction and to follow up with the interviewer immediately after the call.

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