Multi-Mode Surveys Using Address-Based Sampling: The Design of the REACH U.S. Risk Factor Survey

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Abstract

Problems with traditional random digit dialing (RDD) studies—namely declining coverage and low response rates—have led researchers to examine alternative designs. One potential replacement is Address-Based Sampling (ABS) coupled with multimode data collection. In contrast to traditional RDD sampling (where numbers are randomly chosen from banks of active telephone numbers) or field-based sampling (where staff manually list each residence in a given area), ABS relies on a precompiled list of addresses (typically based on the USPS delivery sequence file).

The Racial and Ethnic Approaches to Community Health Across the U.S. Risk Factor Survey (REACH U.S.) is one of the first large-scale surveys to employ a multimode ABS approach. REACH U.S. is a project sponsored by the Centers for Disease Control and Prevention to eliminate health disparities among racial and ethnic minority populations. The CDC established cooperative agreements with 40 grantees who implement interventions that are designed to target health disparities in their communities. A risk factor survey (RFS) is administered annually in these communities to monitor progress and achievements. REACH U.S. RFS will conduct 900 interviews in each of 28 communities. The REACH U.S. RFS will employ ABS combined with data collection via telephone, mail, and face-to-face interviews.

In this paper, I discuss the ABS design for REACH US and the practical implications of this design.

Key Words: REACH U.S., Address-Based Sampling, Multimode Surveys

1. Background

The REACH Risk Factor Survey (REACH RFS) has been conducted since 2001 as part of the evaluation for the Racial and Ethnic Approaches to Community Health programs (originally REACH 2010 and now REACH U.S.). This program is design to eliminate racial and ethnic health disparities in the United States. The primary mechanism through which this program attempts to accomplish this goal is through the funding of innovative community health programs. The REACH RFS interviews residents of these communities to monitor changes in health and health behavior. Traditionally, this was accomplished through an RDD telephone survey.

The viability of traditional RDD studies has recently been called into question on a number of fronts. First, growth in the number of assigned blocks of telephone numbers has been disproportionate to growth in the number of activated household numbers. Thus the density of working residential numbers is now significantly lower than just a few years ago, reducing the yield of an RDD sample of a given size so that more numbers

must be dialed. Second, the proportion of working residential numbers in zero banks has increased considerably so that the use of listed directories to eliminate these banks now leads to significant undercoverage of the target population. Recent research has suggested that the coverage loss may now be as low as 5% (Boyle et al. 2009) or as high as 14.5% (Fahimi et al. 2008).

Equally problematic, the typical list-assisted RDD design excludes most cell telephone numbers despite the recent rapid growth in the proportion of households that rely only on cellular telephones and do not have a traditional landline telephone. In the first half of 2009, 20.2% of households and 18.4% of adults were estimated to have only cellular telephone service. This research also suggests that up to 14.5% of households have landline telephones but rarely or never answer them, preferring to communicate by cellular telephone. Complicating matters further, these factors are known to be highly correlated with the characteristics of many REACH communities: Those who live in poverty, have less education, are members of racial or ethnic minorities, rent their homes, live in urban areas, or are under 65 are all less likely to be well covered by landline surveys (Blumberg and Luke 2009).

Thus NORC proposed a multi-mode address-based sampling approach for the REACH U.S. RFS. In this paper I will describe the rationale behind this approach and the design that was ultimately settled on for the REACH U.S. RFS.

1.2 REACH U.S. RFS Constraints

REACH U.S. RFS is designed to evaluate the Racial and Ethnic Approaches to Community Health Across the U.S. program in 28 communities spread across the country. Each of these community programs focus on reducing health disparities in either cardiovascular disease, diabetes, asthma, breast and cervical cancer, adult immunizations, or Hepatitis B. They also are, generally, poorer than the general population and have relatively large populations of minorities. Beyond those few similarities, however, the communities vary in substantial ways. Some are rural; some are urban. They are spread across the country. They vary in population size from Orange County, California (with 4.5 million residents) to the Eastern Band of Cherokee Indians in North Carolina (with a population of 4,646). They vary in geographic size from all of Oklahoma to a small neighborhood on Chicago's North Side. And despite having generally high proportions of minority residents, they vary substantially in survey eligibility from under 5% to over 80%. Thus, rather than having one survey population, REACH U.S. RFS really has 28 separate survey populations under one umbrella.

The survey is intended to administer a health questionnaire based heavily on the Behavioral Risk Factor Surveillance System to the ethnic population of interest to the community program. Thus the survey must screen for both geographic eligibility and racial eligibility. In communities targeting breast and cervical cancer, the survey also requires an oversample of women. In communities with a focus on elderly immunization, the survey also requires an oversample of elderly. In each community, the goal is to achieve 900 interviews.

1.2 Potential Designs

Given the constraints of the REACH U.S. RFS, four potential designs were considered. First, RDD was considered. RDD was the design of previous REACH RFS waves, so this mode had the advantage of being both a known quantity and being consistent with previous waves. However, as noted in the introduction, there are serious concerns about the coverage of RDD surveys, particularly among some of the communities of most interest to the survey. Further, the geographic screening in some areas required an extremely complicated screener (for example, "Are you north of this street or south of this street? Are you on the left side of the street or the north side of the street?"). Thus, early on, it was decided that RDD would not be appropriate for future REACH U.S. RFS rounds.

The simplest design change would have been to simply add a sample of cellular telephones to the RDD. Thus, the second design considered was an RDD + Cell design that accounted for undercoverage in the RDD design by including a sample of households with only cellular telephones. However, such a design posed two serious hurdles. First, no control totals are available for the proportion of the population in each community that are cell-only. This would make proper weighting of responses extremely challenging. Second, as previously mentioned, this survey requires substantial geographic screening. However, it is currently impossible to draw cellular telephone samples with anything close to the degree of specificity required by REACH U.S. RFS. Therefore this design would require a substantial amount of additional screening to find an eligible sample.

Face-to-face interviewing could solve some of the problems described above. Because interviewers would be visiting an address, neither geographic screening nor telephone coverage would be issues. Face-to-face interviewing also has the advantage of having generally high cooperation and response rates. However, an across-the-board face-to-face survey would be extremely costly, even in relatively compressed geographies.

Thus, a fourth approach was settled upon: multi-mode interviewing using address-based sampling (MM-ABS). The belief was that such an approach would eliminate both the coverage issue (because addresses would be chosen households with both landlines and/or cellular phones) and the geographic screening issue (as the sample could be geocoded and precisely targeted). In addition, MM-ABS was determined to be cheaper than a full face-to-face design but it would still allow for face-to-face followup with non-responders to facilitate non-response bias analysis and adjustments.

1.3 MM-ABS Design Priorities

MM-ABS designs can take a number of forms. Once a MM-ABS design was settled upon, a key group of three priorities were put forward to help guide the MM-ABS design of the REACH U.S. RFS. First, we wished to maximize the number of telephone interviews. This was made a priority in order to reduce differences between prior survey years and the current survey. Second, we wished to maximize coverage. This was a clear priority in choosing MM-ABS in the first place and key to the REACH focus on very specific, often hard-to-reach, racial and ethnic communities. Third, we prioritized minimizing bias and optimizing response rates relative to cost.

2. Survey Design

With the above design priorities set, we finalized a design for REACH U.S. RFS that will be summarized in the remainder of this paper. Figure 1 presents a simplified schematic of the general REACH U.S. RFS design. In summary, we begin by drawing a sample of

addresses from each REACH U.S. community. Those addresses are sent to an outside vendor to match the address to a telephone number. If a telephone number is found, the address proceeds to CATI. If a telephone number is not found, the address is mailed a shortened questionnaire or worksheets whose primary purpose is to solicit a telephone number. Where a telephone number is received, the case is sent to CATI. Where a telephone number is not received from the worksheet or where a CATI interview cannot be completed with a respondent, the address is sent an SAQ. Finally, addresses that fail to complete the interview in any other format are eligible for subsampling for face-to-face follow-up. We expand upon each of these boxes below.

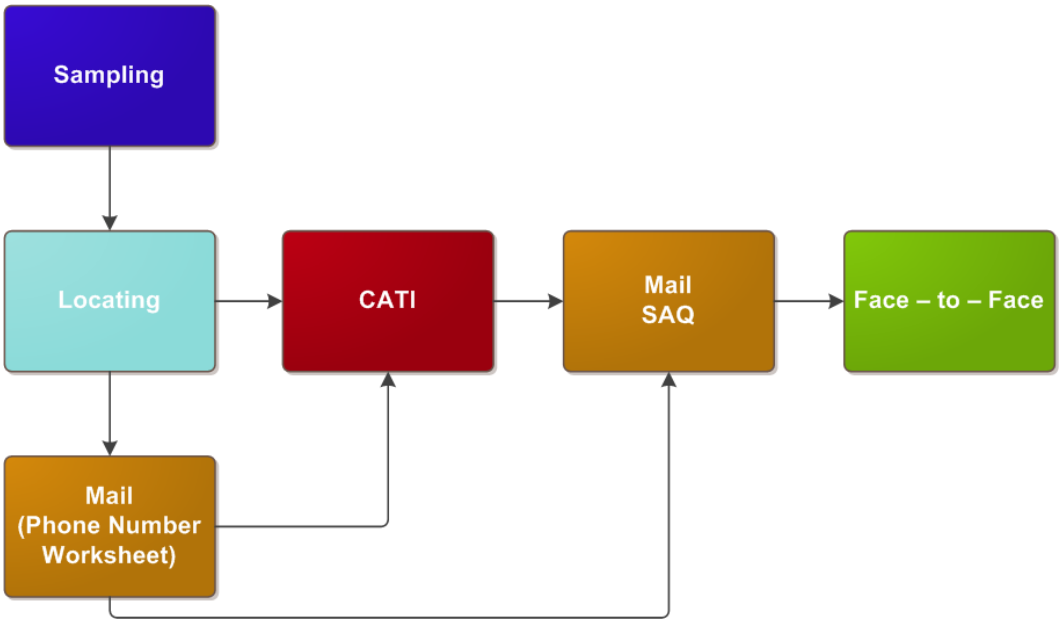

Figure 1: REACH U.S. RFS Simplified Design

2.1 Sampling

Sampling for the REACH U.S. RFS begins with a national frame of addresses derived from the USPS delivery sequence file. That frame is then matched to each community's geography to develop 28 community-specific frames.

One issue many surveys have with address frames is the use of rural (or "simplified") addresses. These are unique addresses that are delivered to a central location (e.g., a row of mail boxes). Thus, for traditional face-to-face surveys they cannot be used because there is no way to tie the address to a particular house. However, for our design they can be used because they allow mail to be sent to the house (though they would not allow face-to-face follow-up in the event of non-response). We also chose to include addresses where the post office indicated that an address was vacant or where the post office indicated a postal box was the only means a person had to receive mail.

We also chose to include addresses that were classified as "drop points." These are addresses where one address is used for multiple units. For example, some apartment buildings possess no individual unit numbers and have all mail delivered to a central

room. While this would not be a problem for a face-to-face survey (interviewers visiting the site could assign arbitrary unit numbers), it poses difficulty for locating telephone numbers for these addresses and for mailing. We thus decided to include these addresses but move them directly to face-to-face subsampling.

2.2 Locating

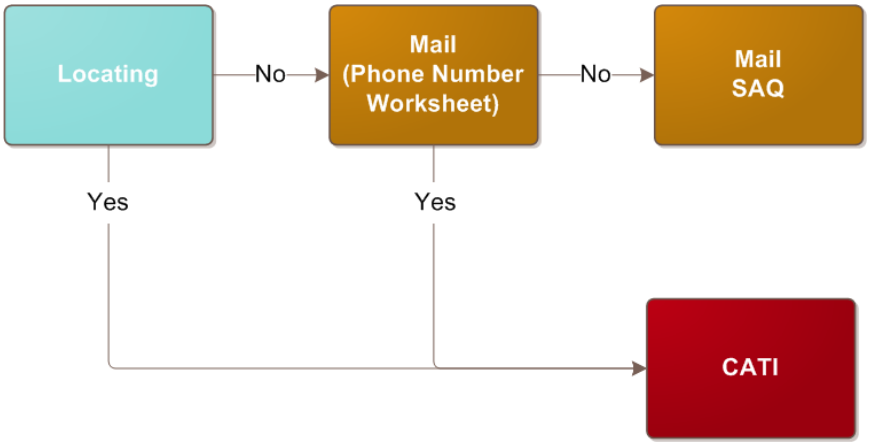

Figure 2: REACH U.S. RFS Locating Design

After sampling, all addresses were sent to an outside vendor for matching. Initially two outside vendors were employed; however, initial batches showed that there was minimal gain from sending cases to two vendors, so only one vendor was retained. Match quality was ranked by vendor as a high, medium, or low likelihood match. The low likelihood matches were not matched on the unit or apartment number and therefore we deemed them unusable.

Initial match rates varied significantly from area to area. One unanticipated complication was the number of duplicate telephone numbers returned from vendors (that is, the same telephone number was returned for more than one address). In cases where a duplicate telephone number was returned, we arbitrarily assigned the number to one of the matched households.

Where we were able to find a telephone number, the household was sent to CATI for dialing. In some cases, more than one telephone number was found for a particular address. Where this was the case, telephone numbers were dialed sequentially until one was found associated with the correct address. More detail about CATI procedures follows below.

Where a telephone number could not be located for a given address, the case was sent a brief, self-administered questionnaire of "phone number worksheet." The purpose of this phone number worksheet was to solicit a telephone number from the respondent in order to allow him or her to be contacted via CATI. This questionnaire is described in more detail below.

2.3 Telephone Number Worksheet

A telephone number worksheet was sent to households when a telephone number was not found during locating. The primary purpose of the worksheet was to solicit the

respondent to send a telephone number so he or she could be contacted. Thus, we included a letter describing the survey, the worksheet, and a prepaid, pre-addressed return envelope. The worksheet is included as Appendix 1.

Initial returns for the telephone number worksheet were extremely poor. Overall response rates were less than 3%. Thus, after the first several replicates, a decision was made not to send additional telephone number worksheets. Cases where a telephone number could not be located were sent directly to the full SAQ treatment.

An experiment was embedded in the telephone number worksheet mailing. Two forms of the worksheet were mailed. Approximately half of the respondents received a minimal worksheet that simply asked for a telephone number, while the other half received a more robust worksheet that asked several questions useful for determining eligibility as well as soliciting a telephone number. Results from this experiment will be presented at a later date.

2.3 CATI

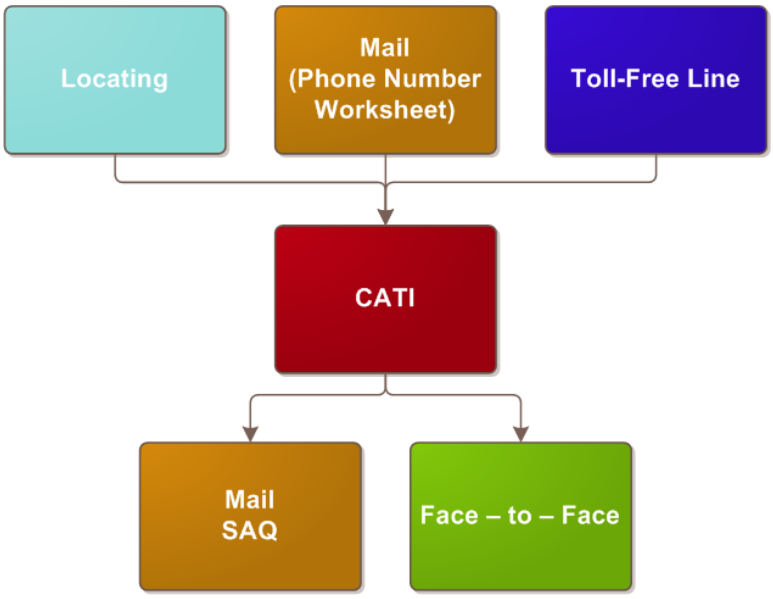

Figure 3: REACH U.S. RFS CATI Design

Cases could enter CATI through one of three paths. First, any case where a telephone number was found during locating was sent to CATI for dialling. Second, when a telephone number was not found during locating but was returned via the telephone number worksheet, the case was also sent to CATI. Third, a case receiving either an advance letter (if a telephone number was found during locating) or a telephone number worksheet could contact us via a toll-free number.

The CATI system operated similarly to a typical RDD CATI system with a few small changes. Most important, because the sampling unit of this survey is the address (and not the telephone number as in traditional RDD surveys), we felt it important to confirm the address because there is no guarantee that the number reached is tied to the address of interest.

An incentive experiment was imbedded in the CATI treatment. Reluctant respondents where eligibility was established were divided into either a control group receiving no incentive or an experimental group. The experimental group respondents were mailed a $5 prepaid incentive with a promise of an additional $10. Results from this experiment will be presented at a later date.

2.4 SAQ

Cases where a telephone number was not located or returned via a telephone number worksheet as well as cases that were dialed in CATI but did not complete the interview (either because of non-contact, an incorrect telephone number, or refusal) were eligible to receive a full SAQ treatment. It was also possible to request an SAQ via our toll-free number, though this option was not explicitly highlighted in any advance materials sent to households. Figure 4 illustrates this.

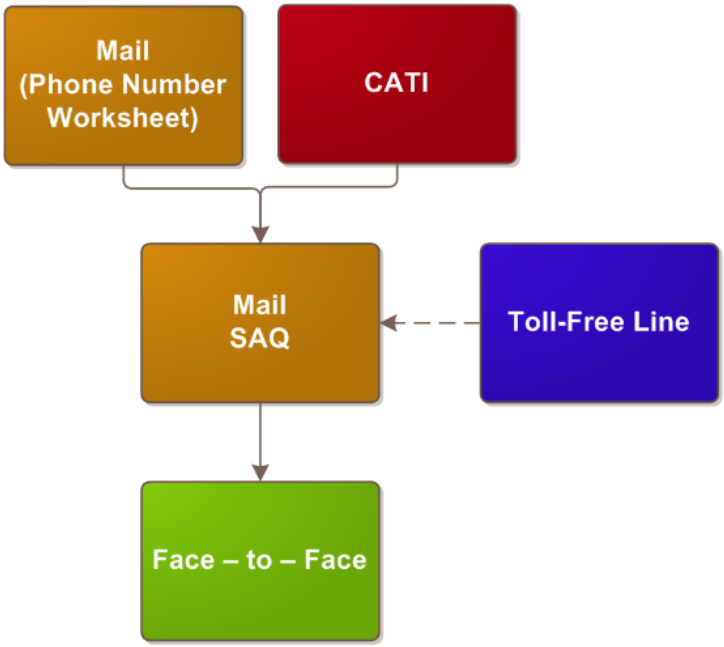

Figure 4: REACH U.S. RFS SAQ Design

Two SAQs were sent to each household with instructions that all adults living at the household should complete one (and with instructions on how to request additional SAQs if they were necessary). The SAQ had all substantive questions included in the CATI version of the instrument, with only minimal reformatting of some questions to make them appropriate for paper administration. Approximately two weeks after the initial mailing, a reminder/thank-you postcard was mailed. Two weeks after the reminder postcard, a second SAQ packet was sent to non-responding households.

An incentive experiment was also imbedded in the SAQ treatment. Approximately one-third of the cases receiving an SAQ received no incentive. Another one-third received a $5 prepaid incentive with a promise of an additional $10 once the SAQs were returned. The remaining third of SAQs were mailed with only the $5 prepaid incentive. This

experiment was separate from the CATI incentive experiment (that is, households receiving a CATI incentive were not eligible for a SAQ incentive). Results from this experiment will be presented at a later date.

2.5 Face-to-Face

Finally, cases not interviewed in other modes were eligible for face-to-face sampling. Due to the cost of face-to-face interviewing, only a subsample of cases was interviewed in the field. Cases could go directly to face-to-face interviewing if they were drop points. For some addresses, the U.S. Postal Service indicated that the address did not accept mail. Thus, if locating was unsuccessful, the case would go directly to face-to-face from locating. Similarly, a "do not mail" case that was located but where interviewing was unsuccessful would move from CATI to face-to-face. Finally, cases that received the full mail treatment but did not complete were sent to face-to-face interviewing.

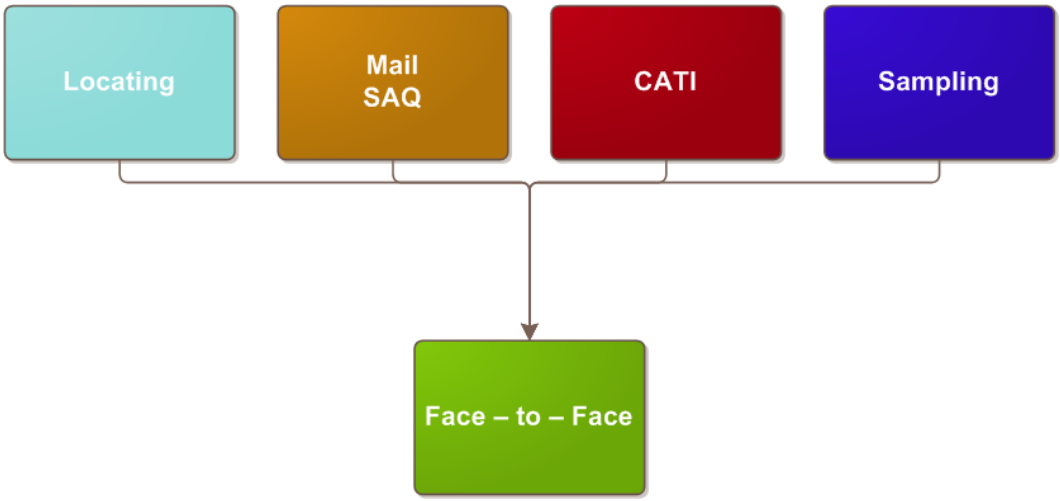

Figure 5: REACH U.S. RFS Face-to-Face Design

3. Conclusions

Above we presented an overview of the REACH U.S. RFS design. Though the first round of REACH U.S. data collection has yet to leave the field, several early conclusions can be drawn from our preliminary experiences.

First, researchers interested in ABS should be aware that the time in field that this method necessitates is substantially longer than a straight CATI system. When one factors in the sequential nature of modes that some cases must go through, field time can easily be doubled, if not tripled.

Second, multiple modes creates an exponentially more complex design than a single mode. As modes multiply, the number of different avenues through which a respondent

could conceivably complete the survey multiply. Researchers should use caution as they approach designing their survey systems for dealing with these paths.

Finally, despite some initial obstacles, NORC remains optimistic about the potential for multi-mode address-based sampling designs. Though this methodology may not be the "silver bullet" that solves all of the problems with RDD, it is a valuable and powerful tool to be added to our collective methodological pocket.

References

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Appendix 1: Telephone Number Worksheet