Comparing the Availability & Accuracy of Sample Indicators Across Two Samples: Address Based Sampling vs. Telephone

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Abstract

Address based sampling compared to random digit dialing landline telephone sample, has become a viable alternative as a sampling methodology, especially given the issues commonly associated with the use of RDD (exclusion of cell only homes, number portability issues, and decline in participation of younger demographic). Both approaches offer the potential to append an array of demographic information and can be used to tailor mailings and incentives toward respondents to gain cooperation. The focus of this paper is to compare the two and to examine: (1)types of information that is innate to each, (2)availability & accuracy of demographic indicators, and (3)improvement areas for the utility of these indicators. The differences noted will be discussed within our broader understanding of the benefits that each offers and how these indicators can be used to enhance the recruitment process.

Key Words: Address based sampling (ABS), RDD, telephone sample, sample indicators, age indicator

1. Introduction

Until recently, the Nielsen Company utilized a random digit dialed (RDD) telephone sample approach to recruit households for their TV Ratings Survey. After several years of internal testing (Shuttles et al. 2008; Shuttles et al. 2009), Nielsen transitioned away from a telephone sampling approach to an address based sampling approach (ABS) which unlike RDD is based on a database of randomly selected addresses rather than telephone numbers. The literature on ABS indicates that using an address based sampling approach in lieu of a telephone approach provides several clear advantages: (1) the ability to include the sampling of cell phone only homes, (2) addresses issues related to telephone number portability, and (3) the ability to include younger hard-to-reach demographics. Conversely, the three items just mentioned are the same ones commonly cited as limitations when using RDD (as cited in Link et al., 2009). In addition, the sampling of addresses provides a myriad of opportunities for researchers to deploy a variety of recruitment strategies beyond the traditional mail survey (i.e., telephone and web surveys) and varying the use of incentives for targeting of specific groups.

ABS as a sampling methodology for the TV diary survey is a relatively new sampling methodology (used by Nielsen since 2008) and consequently the focus has been limited in evaluating the types of data that are readily available in ABS and how these variables may differ in accuracy to data available in RDD. Furthermore, comparisons have not been made to assess the overall accuracy and quality of these types of indicators across these samples. Thus, the focus of this paper is to juxtapose ABS and RDD and to examine three areas of interest: (1) the types of information that is innate and specific to

each sample, (2) the availability and accuracy of demographic indicators as it pertains to Hispanics and age, and (3) the next steps (or areas for improvement) for the utility of these indicators. More specifically, the data used for this paper will be taken from a TV diary survey period where RDD was the sampling approach used (February, 2008) and compare this to another survey period where ABS was used (March, 2009).[1] And lastly, the differences and findings noted between these sampling approaches will be discussed within our broader understanding of the benefits that each sample has to offer and how these indicators can be used to enhance the survey recruitment process.

2.0 Methodology

For the TV diary survey there are some subtle differences that should be noted as it pertains to the recruitment process between RDD and ABS. These differences though subtle are related to the simple fact that one approach uses addresses while the other uses telephone numbers. The differences that exist between the two approaches are most notable at the mail recruitment stage, the use of incentives at the pre-recruitment mail stage and the use of a modified script at phone recruitment.

2.1 Overview of RDD Approach to Sampling and Recruitment for TV Diary

For almost 30 years, the TV diary survey was conducted several times each year using a mixed-mode sampling design. The first stage of sampling uses a traditional RDD sample, in which any 100-block of telephone numbers with at least one listed telephone number within all area codes and local prefixes is eligible for serving as a random-seed to create an RDD number for use in the sampling pool (cf. Lavrakas, 1993).Those phone numbers that are matched to an address are then mailed an advance letter prior to the first stage (i.e., phone recruitment) informing the household that they have been selected to participate in the diary survey and that Nielsen will be contacting them soon for recruitment. The second stage of the Nielsen diary survey uses a mail mode to send the data collection instrument (i.e., a TV Diary which serves as the "questionnaire") to all households with a mailable address. More specifically, at the second stage, each household is mailed at least one diary, along with a cover letter, a non-contingent cash incentive (ranging from $1 to $30 depending on the demographic characteristics of the household), and a postage paid return envelope. See Table 1 for a complete overview of the TV Diary recruitment process for RDD.

[1] Within a given year, Nielsen has four TV survey measurement periods (February, May, July and November) and also is commonly known as "sweeps" months where households are sampled across the United States for each measurement. Due to the scheduled digital television (DTV) transition mandated by congress for February 2009, the February diary measurement was delayed until March 2009.

Table 1. TV Diary Recruitment Process for RDD (Telephone Sample Approach)

Step 1. RDD Telephone Sample (phone numbers matched to addresses)
Step 2. Pre-recruitment Mailing Sent to Households
Step 3. Recruitment Phone Call
Step 4. Mail TV Survey (including non-contingent incentive)
Step 5. Reminder Phone Call: Remind Household to Complete Diary and to Return TV Survey
Step 6. TV Survey Returned by Mail and Processed

2.2 Overview of ABS Approach to Sampling and Recruitment for TV Diary

The ABS approach has been used for the TV diary survey for almost two years replacing the traditional RDD approach commonly used for sampling within the research industry. Because of the composition differences between the ABS (address based) and RDD (telephone based), it added new opportunities whereby creating new mailings to the TV survey recruitment process. More specifically, within ABS, approximately 60% of the sample can be matched to a telephone number (commonly referred to as "matched records") while the remainder of sampled addresses (about 40%) cannot be matched to a telephone number (commonly referred to as "unmatched records"). It is here, with the unmatched sample where there is no telephone number available that within the TV process "new" mailings to the front end of the recruitment process were added (see Table 2, Steps 2-4 for the unmatched sample) with the goal of obtaining a phone number from these households to include them in the phone recruitment stage. [2] See Table 2 for a complete overview of the TV Diary recruitment process for ABS.

Table 2. TV Diary Recruitment Process for ABS (Address Sample Approach)

Matched Sample

Step 1. ABS Sample--
Phone Numbers Matched to Addresses
Step 2. Pre-recruitment Mailing
Step 3. Recruitment Phone Call
Step 4. Mail TV Survey
(Including Non-contingent Incentive)
Step 5. Reminder Phone Call
Step 6. TV Survey Returned by Mail and Processed

Unmatched Sample

Step 1. ABS Sample --
Phone Numbers Not Matched to Addresses
Step 2. Pre-recruitment Mailing
Step 3. Pre-recruitment Survey
Step 4. Pre-recruitment Reminder Postcard

[2] For ABS, with respect to the "unmatched sample" the recruitment phone script is a modified script and is shorter in duration than the script used for RDD. This is due to the fact that some of the demographic information is collected in the survey sent to households prior to the recruitment call. Also, the recruitment process for the matched portion of ABS is identical to what is used for TV Diary in the RDD world.

Step 5. Recruitment Phone Call (Modified Script)
Step 6. Mail TV Survey
(Including Non-Contingent Incentive)
Step 7. Reminder Phone Call
Step 8. TV Survey Returned by Mail and
Processed

Note: For the unmatched sample in Step 3, in addition to gathering a phone number to be used in the phone campaign, general demographic information is also gathered.

3.0 Types of Information, Innate and Specific to Each Sample—Comparison of RDD and ABS

The February 2008 TV diary measurement was based on RDD sampling of targeted households stratified throughout 189 of the largest metropolitan areas of the U.S. More specifically, the gross master sampling file[3] contained 1,823,671 telephone numbers designated for regular sample and 1,076,242 over sample numbers which specifically targeted the hard-to reach demographics (i.e., head of householder where age is 18 to 34 years, black or Hispanic). In total, there were 2,899,913 telephone specs contained within this RDD sample file.[4]

The March 2009 TV Diary measurement was based on ABS sampling of targeted households stratified throughout 189 of the largest metropolitan areas of the U.S. Within the gross master sampling file, there were a total of 667,928 addresses designated for regular sample and 543,588 over sample records specifically targeting head of households between age of 18-34, blacks and Hispanic households. In total there were 1,211,516 address specs contained within this ABS sample file.

When contrasting the two samples there are some notable differences to highlight: (1) differences in sample size, (2) availability of address type information within ABS, (3) accuracy and availability of the Hispanic surname indicator, and (4) accuracy and availability of the age indicator. The later two sample indicator items (i.e., Hispanic surname and age indicator) will be examined in more detailed in terms of their accuracy and how this type of information is used differently in ABS than in RDD.

3.1 Sample Size

First from a sample size perspective, the initial sample sizes used for ABS compared to RDD is considerably smaller with respect to the initial designated sample and oversample designated for head of householder 18-34, blacks and Hispanics. That is to say, that the ABS sample itself requires less sample (i.e., more efficient) to achieve the desired target numbers in returns than an RDD sample. For example, across both survey periods the total sample for ABS (total records, 1,211,516) was about 2 times as small as the RDD sample (total records, 2,899,913). Also, there was a reduction in the required over sample records provided for ABS sample (543,588) compared to number of records designated

[3] The gross master file is the initial large sample file where all records are selected to deliver specified targets.
[4]There were eight market areas sampled in February 2008 (RRD) that were not sampled in the March 2009 (ABS). Thus, these eight markets were excluded in the analyses—approximately 280,000 records were excluded.

for oversample in RDD (1,076,242).[5] In terms of sampling efficiency, one factor that should be noted though not apparent when only comparing sample sizes is inherent in the nature of the two samples—the use of telephone numbers vs. mailing addresses. For example, the ABS contains known residential addresses whereas in RDD it is based on phone number where it is likely that these randomly generated numbers may not be assigned to anyone. This is likely to be the case about 40% of the time where telephone records can be eliminated prior to calling (i.e., not in service telephone numbers).

3.2 Address Type

Secondly, unlike the RDD sample the ABS sample contains specific address type information for each unique record within that sample file. The possible address type classifications are: (1) augmented address, (2) city style address, (3) drop-point address (one address associated with multiple units—apartments), (4) educational address, (5) PO Box address, (6) vacant address, (7) throwback addresses (households that appear twice in the sample file as a PO Box address and city style address), (8) vacation / seasonal address, and (9) group quarters (military barracks or dormitories). Out of these classifications, a small portion of these address types were excluded from the sample used for the TV diary survey because they were either not part of the population of interest (i.e., vacation / seasonal and group quarters) or they were duplicate sampling units represented and accounted for in another address unit (i.e., throwbacks addresses) (Nielsen Company, 2008; Link et al., 2009). As noted in Table 3, over 80% of address types are city style followed by the second largest, PO Box addresses.

Table 3. Address Type (March, 2009--Address Based Sample)

Address Type:	Frequency	Percentage
City Style Address:	997667	82.3%
P.O. Box Address:	129092	10.7%
Vacant Address:	73908	6.1%
Augmented Address:	5856	.5%
Drop Point Address:	3643	.3%
Educational Address:	1350	.1%

In diving deeper with respect to address types, many of the records thought to possibly be Hispanic (i.e., records flagged by vendor as having a Hispanic surname) predominantly have “city style” addresses and were less likely to have another type of address (see Table 4).

Table 4. Address Type for Those Records Flagged with Hispanic Surname Indicator On Sample File

Address Type:	Frequency	Percentage
City Style Address:	87807	91.5%
P.O. Box Address:	5406	5.6%
Vacant Address:	2150	2.2%

[5] Another contributor to the difference in sample size between RDD and ABS that should be noted is the fact that in March 2009 disproportionate sampling was introduced which directly impacted less of a need for over sample records (i.e., in particular for younger demographics).

Augmented Address:	203	.2%
Drop Point Address:	352	.4%
Educational Address:	42	.0%

3.3 Sample Indicators

The Hispanic surname indicator and the age indicator are sample indicators that are provided on both the RDD and ABS samples. Based on information provided by the sample vendor, records will be flagged or designated affirmatively if it is known that any given household is Hispanic based on the surname. Also, when the age of the head of household is known this information is passed along in the sample file. Specific to the RRD, 2.2% of telephone numbers were reported to have a Hispanic Surname whereas for ABS a larger percentage, about 7.9% of addresses were reported to have a Hispanic Surname. As for the age sample indicator, approximately 17.7% of all records in the RDD and 44.3% of all records in the ABS sample were provided with an age indicator. See Table 5 for more information on the break-outs and composition for the age sample indicator. So in terms of the availability of an indicator more records were flagged within the ABS sample. The availability of having more records within ABS, lends itself more to the opportunity to potentially leverage more records (in comparison to RDD) for incentive targeting.

Table 5. General Characteristics for Age Sample Indicator

RDD Telephone Sample (Feb, 2008)

Age Indicator	Frequency	Percentage
Under 35	97,735	3.4%
35-49	140,663	4.9%
50+	273,555	9.4%
Age Unknown	2,387,960	82.3%

ABS Telephone Sample (March, 2009)

Age Indicator	Frequency	Percentage
Under 35	116836	9.6%
35-49	127826	10.6%
50+	292341	24.1%
Age Unknown	674513	55.7%

4.0 Results

The results discussed here will be examined in more detail, looking at the accuracy of the Hispanic surname indicator and the age indicator and how this known information is used within ABS versus RDD. First, this paper will examine the accuracy within each of the samples respectively and then will compare the accuracy across both ABS and RDD. For the results section of this paper, the data will be restricted to looking at: (1) regular sample excluding oversample and additional sample--records used to target specific

demographics or records added later during the survey period and, (2) limiting the comparisons of the indicators to the matched portion of the RDD sample (i.e., sampled telephone numbers matched with an address via commercial directories) and to the ABS portion of the matched sample (i.e., sampled address is matched to a telephone number) since they are most similar.[6]

4.1 Examination of Sample Indicators

To assess the accuracy of these indicators, the values for these variables that exist on the sample file as provided by the sample vendor will be compared to the responses gathered by the respondent as captured in the TV diary survey. From the initial sample, of records with a Hispanic surname indicator, only 13,641 households were mailed a TV survey dairy and for the ABS sample approximately 19,734 records were mailable.[7] It is these responses from these households collected at the diary stage that will be compared to the sample indicator flagged provided by the vendor to determine the accuracy of the Hispanic surname flag. That is, to determine if the household truly is a Hispanic household as indicated by the Hispanic surname indicator.

In looking at all mailable records at the diary responses to the Hispanic Question, these responses to the records flagged with a Hispanic surname indicator, the accuracy (or match) between the two samples are fairly similar--RDD = 26.9% , ABS = 19.9% (See Table 6). Among other known characteristics for households confirmed to be Hispanic, these households were typically (1) 50+ years of age, (2) had a city style address (3) less likely to have a DVR and, (4) and likely to be Spanish Speaking. Excluding the city style address which is not an existing variable on the RDD sample, the household characteristics were quite similar across both samples.

Table 6. Accuracy of Hispanic Surname Indicator Versus Hispanic Identity Collected At the Survey Stage

RDD Sample

	Hispanic Surname Indicator	
	Percent Accurate	Frequency
Hispanic Identity Captured in the TV Diary	26.9%	3678

ABS Sample

	Hispanic Surname Indicator	
	Percent Accurate	Frequency
Hispanic Identity Captured in the TV Diary	19.9%	3935

Note. These records were limited to regular sample, mailable and matched records only. The Hispanic accuracy rating for this indicator was significant between the two samples, X^2 (1, N = 33,375) = 225.91, $p < .00$.

[6] The matched portions of the sample for RDD and ABS are viewed to be most similar to each other because these segments of the sample receive very similar mailing and phone treatments in contrast to the ABS unmatched sample. See Table 2 for more information on recruitment differences between the two samples.

[7] For both RDD and ABS, all households are considered mailable and are mailed a TV diary survey unless a household indicates that they are employed by the media industry, a place of business, or group housing.

4.2 Examination of Age Indicators

For the age variable, the accuracy for this indicator will be assessed at each of the three age groups for head of householder: (1) 18-34 age group, (2) 35-49 age group and, (3) 50+ age group. Similar to the Hispanic sample indicator, the values for these variables as provided by the sample vendor will be compared to the responses gathered by the respondent as captured in the TV diary survey. When contrasting each of the respective age groups, the percent accuracy was higher for each age group within ABS compared to RDD (i.e., ABS, 18-34 group = 69.1% vs. RDD, 18 -34 group = 50.7%). Also, as a whole the ABS sample was more accurate across the three age groups than compared to RDD. See Table 7 for more information on accuracy. Among other characteristics for households where age was confirmed, the 18-34 age groups was more likely to have a DVR followed by the next age group which were the 35-49 year olds. This was true across both samples. In the ABS sample, households in all three age categories were more likely to have a city style address over any other address type.

Table 7. Accuracy of Age Indicator (Initial Sample File) Versus Age Indicator Collected at the Survey Stage (Regular Sample Only)

RDD Sample

	Age					
	18-34		35- 49		50+	
Age Indicator (% Accuracy)	50.7%	5,453	74.9%	22,424	92.7%	64,411

ABS Sample

	Age					
	18-34		35- 49		50+	
Age Indicator (% Accuracy)	69.1%	4,238	86.0%	14,906	94.9%	57,881

Note. These records were limited to regular sample, mailable and matched records only. The accuracy of the age indicator was significant for each of the age groups between the two samples, age 18-34: X^2 (1, N = 13,952) = 2435.2, $p < .00$; age 35-49: X^2 (1, N = 46,720) = 7775.9, $p < .00$; age 50+: X^2 (1, N = 133,992) = 13119.8, $p < .00$

5.0 Discussion and Future Enhancements

With the recent transition away from RDD to the ABS sample, there were some notable general improvements for this transition as they pertain to (1) the ability to sample cell phone numbers, (2) address the concerns related to number portability, and (3) the ability to target the hard-to-reach demographics. Also, more specifically with the advent of ABS, there is information now available in the form of a Hispanic surname indicator and age indicator that can be used to drive various types of methodologies (i.e., mail, web and phone recruitment) coupled with other forms of incentive treatments (alternative cash incentives or contingent incentives, etc.). At first glance, with respect to available indicators (i.e., Hispanic surname indicator and age indicator), these variables are commonly available on ABS and provide opportunities to tailor recruitment efforts towards these known demographics especially when the accuracy known about these

indicators are fairly accurate. For example, though the Hispanic surname indicator is quite comparable in terms of accuracy across the two samples, the ABS sample provides more opportunities to potentially recruit households just by the shear number of more records made available with the Hispanic indicator. This information alone can be used to deploy different types of recruitment methodologies with the underlying goal to target specific households (i.e., customized Hispanic materials etc.) or increase incentives with the end goal of increasing participation of this hard-to-reach demographic. Similarly, the age indicator can be used to target specific age groups. In the end, these indicators that are readily available within ABS can be used to enhance various components of the survey recruitment process. Currently, with the TV diary survey, the Hispanic surname indicator is being used within the ABS matched and unmatched sample to send customized mail materials to these households in addition to providing a larger incentive to these households. Likewise, with the age indicator, households are mailed and provided differential incentives dependent on the age indicator and are consequently provided more incentive if a households is believed to belong to a specific and targeted age group.

There are several other demographic related indicators that are available and often provided by the survey sample vendor. Some examples of these in addition to the ones discussed in this paper are indicators related to income, availability of e-mail addresses, education, and other Census type information. To this end, research is being conducted whereby indicators like age, race and ethnicity are being used to target specific levels of mail and incentive treatments. These types of demographic information could be used to supplement readily available geo-coding and socio-economic Census-type data and could be used by researchers to target specific levels of incentive treatments to individual addresses in a mail survey or included in an advance contact letter. In theory, using demographic information (e.g., Spanish surname indicator) to target especially hard-to-reach and hard-to-convince demographic groups should help to compensate for the traditionally lower responses observed with these groups. To date, there are two additional indicators that are under development and under future consideration for the TV diary survey (1) the use of the black indicator, and (2) refinement of the Hispanic information (use of geo-coding) to determine the racial / ethnic composition of a geographic area. Like the Hispanic surname indicator and the age indicator, these indicators can be used to further customize the survey recruitment process with specificity toward these demographics of interest. For example, in terms of multi-modes as offered in TV ABS sample (i.e., where respondents can reply via mail, web or phone), data suggest that the mail mode is the primary mode of return for the pre-recruitment survey (unmatched only) and the other modes like web and telephone are more readily used by groups that are harder-to-reach (i.e., younger demographics, blacks and Hispanics) and this alone would suggest the utility of continuing these modes as return options and the viability of using differential incentives to influence return mode. Were these indicators to racial / ethnicity indicators prove to be encouraging, Nielsen would then begin to use these indicators from the onset to drive survey design from a recruitment and participation perspective and lastly to customize and target incentives for these specific cohorts of interest. Through this research we may learn that the use of these racial / ethnic indicators can only enhance the recruitment strategy and help us begin to address the issue of achieving better representation from these hard-to reach demographics like 18-34 year olds, blacks and Hispanics. In conclusion, examining these and other indicators that are readily available in ABS and from sample vendors may be a viable alternative to improving participation and to further improve sample representation.

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