

# The Use of Targeted Lists to Enhance Sampling Efficiency in Address-Based Sample Designs: Age, Race, and Other Qualities

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## Abstract

Address-based sample (or “ABS”) designs are attractive for population studies due to both the possibility of contacting households with multiple modes as well as high coverage rates. One limitation of ABS is higher costs in situations where the target population has low eligibility, making approaches such as random-digit dial telephone plus cell (or “dual frame”) more efficient. We employed age- and race-targeted lists to enhance an address frame based on the United States Postal Service (USPS) computerized delivery sequence file (CDSF) in a study targeting low-incidence households. Our paper presents results that indicate which factors are more easily captured, and the associated coverage/hit-rate trade-offs in different environments. We also discuss the impact of utilizing lists from multiple vendors simultaneously, and the kinds of households present or absent from one or more targeted list.

**Key Words:** ABS, targeted lists, rare populations, GIS

## 1. Introduction

The First 5 LA Family Survey (or “FS”) was developed to provide representative data about key indicators of well-being for children under age six and their parents in 14 communities in Los Angeles County, California. “Best Start” is an ambitious, place-based initiative with the goal of improving outcomes for children under age six by ensuring they 1) are born healthy, 2) maintain a healthy weight, 3) are free from abuse and neglect, and 4) enter school ready to learn. The FS includes measures of intermediate outcomes that have been linked to the four goals using a research-driven theory of change. Over time, community-level change in these indicators may be used to show movement towards the accomplishment of these four goals. As it has been conceived, the First 5 Family Survey (FS) will be used to inform planning for the next steps in the Best Start community program.

One challenge in designing the FS was the need to ensure coverage and representation in generally-disadvantaged households, with higher rates of poverty and thus cell-only telephony than the rest of Los Angeles County. In addition, our target population was of relatively low-incidence, with approximately 19% of households in target neighborhoods containing at least one zero through five-year old child. Consequently, the FS was designed as a multi-mode address-based (or ABS) study, using mail, telephone, and in-person modes in a set sequence (Link et al. 2011, Iannacchione 2011, Shook-Sa et al.

2013). Potentially our most substantial challenge involved how to efficiently generate 4,200 completed interviews from a limited universe of approximately 82,000 households.

One strategy to improve efficiency in environments where Census or American Community Survey-based stratification would not realize efficiencies involves using age-targeted address lists. Sample vendors can provide a number of targeted household lists, with flags indicating if members of a certain race/ethnicity, spoken language, income, or having particular purchasing characteristics are present. Such data are often modeled and can be derived from a combination of market-research sources, credit bureaus, commercial activity, public records, and Census/ACS data. Due to their nature we may assume that such lists may be limited in terms of their coverage and reliability when compared with Census-derived controls, especially in areas with above-average poverty and mobility. In addition, we would expect that the age of household members would be more difficult to capture than other variables. A non-augmented address list, however, would not have carried the sufficient incidence to complete the survey efficiently.

Our solution was to match multiple vendor-derived targeted lists to an extract of the United States Postal Service computerized delivery-sequence file (DSF or CDSF), using the presence on one of more lists as a stratifier. The motivation behind using multiple lists was to avoid the limitations of coverage and frame-size of depending on a single list. The research described in this paper pursues three questions focused on using age-targeted lists to enhance address-based sampling frames. First, we consider the degree to which vendors vary in their targeted list of households containing children aged zero through five. Second, we compare how the kinds of households who were present on one or more lists differ. Third, we question the adopted survey design based on our results and make recommendations for multi-mode ABS studies of rare populations going forward.

## 2. Background and Methods

The FS sampling frame was based on a version of the U.S. Postal Service delivery-sequence file (DSF or CDSF) provided by the Valassis vendor, enhanced with age- and race-targeted lists. NORC geocoded the DSF and then created subsets in the 14 targeted communities. To determine which households were likely to contain at least one child under age six, age-targeted lists from three sample vendors—which we call Vendor A, Vendor B, and Vendor C—were matched to the Valassis list. Addresses also were matched to a list of households likely to contain Asian/Pacific Islander children in the targeted age range as part of the same process to permit oversample. Such lists have been shown to increase efficiency in low socioeconomic status and race/ethnic minority households without introducing bias. We can say that following matching to the three vendors each element on our basic address list was “enhanced” with the information indicating that it was also one or more targeted list. Households were then selected as part of a stratified systematic design within each community, with an oversample of age- and race-targeted households.

The Family Survey (FS) used a multi-mode ABS design, following a telephone, mail, in-person flow initially, that was changed to be mail, telephone, followed by in-person. Flags were created to track the sample as part of the ABS, list-targeted, and Asian/Pacific oversample and these flags were used to compare key rates and productivity among sample types and between different sample resources. The household-level sample

design for FS determined which households were contacted and screened, but it was the member-level sample design that determined which eligible-household members were selected to complete the survey. The member-level sample was the same for each of the 14 Best Start communities, regardless of household composition. Once contact had been made with an adult member of the household, the screener instrument included a roster used to enumerate up to six children under age six. Adult respondents were asked about up to four of these children in their household during the main interview.

In total, five batches of sample were identified and included in the FS. For sample batches one and two, our first step was to draw a sample of addresses in each targeted neighborhood and send it to a vendor to identify telephone numbers that matched sampled addresses. Advance letters were then mailed to all addresses that matched telephone numbers. Those cases with matched telephone numbers were called in the Computer Assisted Telephone Interview (CATI) center after a two-week delay accounting for mail delivery.

Any cases where an address did not match a telephone number or where a resident did not complete a telephone screening interview were sent a screener by mail that included a \$2 cash incentive, a mail packet with a cover letter explaining the purpose of the survey, and a mail screener booklet. This mail screener was used to determine household eligibility prior to calling the household for the main telephone interview. Households that did not return the mail screener were sent a reminder postcard approximately three weeks after they should have received it (for batches one through three). Finally, a subsample of households that had not yet completed a survey by telephone or for which telephone numbers could not be located was drawn for in-person data collection.

During the early stages of data collection it was determined that households that returned mailed screeners were more productive than those starting from CATI. It was decided to change the approach from “telephone first” to “mail first” starting with batch three. The same procedure described above was followed for households that had not returned a mail screener or had not cooperated by telephone or for which telephone numbers could not be located (either through a sample vendor or by the mail screener), in that they were eligible for subsampling for in-person data collection.

Our main research questions are based on the performance of the three vendor flags used to enhance the basic address file (DSF or CDSF) e.g., how the presence of targeted flags impacted study efficiency and any characteristics of study respondents.

### **3. Results**

Our first research question concerned the relative sizes of the targeted lists provided by each vendor. It is important to note that each was asked for the same type of households in the same areas, essentially the universe of households containing any child under six years old. According to the American Community Survey there were approximately 82,000 eligible households in target neighborhoods, which we may consider our baseline. There was a considerable range in the total number of households provided by each, as follows: Vendor A- 14,000; Vendor B- 41,000; Vendor C- 51,000. Such discrepancies may suggest that each vendor used different sources, algorithms, and rules of assignment. While one vendor had a considerably smaller universe of eligible households than the others, Vendor A, it may not be an issue if it implied a higher eligibility rate or ability to

match telephone numbers e.g., if that vendor was more “conservative” in what it deemed an eligible household. At question, therefore, is how the list sizes influenced key rates, as shown in Table 1.

*Table 1: Comparison of Frame Sizes and Eligibility by Vendor*

<i>Vendor</i>	<i>Frame Size</i>	<i>Eligibility Rate</i>	<i>Telephone Matching Rate</i>
Vendor A	14,000	39%	51%
Vendor B	41,000	35%	53%
Vendor C	51,000	35%	50%
Non-Match Addresses	373,000	19%	52%

As shown in Table 1, vendors who provided fewer records did have higher incidence, but there was no apparent relationship with telephone matching. Moreover, if one considers the “true coverage” of each vendor, or the product of frame size and eligibility, each was relatively small when compared with the known eligible population of 82,000 households. At question is if an address present on more than one list had higher rates of eligibility than those only on one, as this is information that could be used for stratification purposes. Table 2 shows how key rates vary depending on whether an address was one more than one vendor-provided list.

*Table 2: Comparison of Key Rates by Source*

<i>Vendors</i>	<i>Frame Size</i>	<i>Eligibility Rate</i>	<i>Telephone Matching Rate</i>
All Three	6,200	37%	57%
A & B	3,500	41%	57%
A & C	2,100	42%	43%
B & C	22,000	34%	53%
A Alone	3,500	42%	43%
B Alone	10,000	34%	51%
C Alone	20,000	35%	46%
Non-Match Addresses	373,000	19%	38%

Clearly, as shown in Table 2 there is considerable disagreement between vendors in what constitutes an eligible household, with the presence on all three lists not being indicative of the most-confident match. Being present on more than one list did imply a higher telephone matching rate, which is intuitive; households that are more-likely to be “found” by multiple sample vendors would be expected to have characteristics correlated with wire-line telephone ownership. Moreover, addresses only present on one list did not have a substantially lower eligibility rate than those on two or three, which may be counter to assumptions.

*Table 3: Demographics by Source*

<i>Vendor</i>	<i>% Hispanic</i>	<i>% African-American non-Hispanic</i>	<i>Median Household Income</i>
Vendor A	80%	14%	\$21,000
Vendor B	80%	12%	\$24,000
Vendor C	80%	12%	\$24,000
Non-Match Addresses	76%	17%	\$19,000

Beyond key rates, survey practitioners would be interested if households flagged by a particular vendor tended to carry any demographic bias. As shown on Table 3, households present on any list were slightly more Hispanic and less African-American non-Hispanic than those not on a list, which may be illustrative of greater challenges in flagging households as African-American. In addition, households present on one or more list tended to have higher median-household incomes than those not, which is intuitive due to vendor use of commercial and credit-derived sources. Households “only” on one list did not exhibit demographic differences with those on more than one, consistent with key rates shown in Table 2.

Because the FS was motivated to understand healthy behaviors and outcomes, we are interested in knowing how substantive responses may differ by source. As shown in Table 4 households on any list tended to have higher rates of health insurance, but other differences were haphazard. Higher-rates of health insurance may be indicative of less overall disadvantage when compared to unlisted households. In examining other themes there were few differences between lists in mental health, parental support, school enrollment, access to playgrounds, healthy eating, or breastfeeding, and those present were haphazard.

*Table 4: Substantive Responses by Source*

<i>Vendor</i>	<i>% With Health Insurance</i>	<i>Median Weekly Hours of Child Care</i>	<i>Eat Adequate Vegetables</i>	<i>Adequate Physical Activity</i>
Vendor A	98%*	10	65%	81%
Vendor B	97%*	10*	65%*	82%
Vendor C	97%*	11*	66%	82%
Non-Match Addresses	95%	8	61%*	82%

*Note \* indicates measure differs from the overall rate at .05 significance*

#### 4. Discussion and Conclusions

Vendors of age, race, or other targeted lists do provide somewhat different products, and thus may vary in the households that are identified as being likely eligible. In our analysis we found variation in household eligibility, or “hit rate”, but not necessarily in other characteristics between the three vendors we compared. Our results are therefore somewhat encouraging to survey practitioners who see targeted lists as a relatively-safe means to enhance survey efficiency, as there were no systematic differences between the three. Our strategy of creating a “unified” list by matching three vendors to an extract of the USPS DSF did produce the desired results by increasing eligibility sufficient for a multi-mode study with a mail component while maintain overall household coverage. Our approach may be most suitable when the target population, and thus available frame size, is a limiting factor. In addition, it is clear that the incidence rate would impact multi-mode flow decisions, e.g., whether to have or how to move-between mail, phone, web, and in-person contact, as eligibility impacts relative cost of each. It is important to note that we did not use the universe of possible vendors or their products, and may have different results with others.

Our study was based on with what may be one of the more challenging populations for a sample vendor to enumerate, i.e., the age of household children. Children simply have

less available information in comparison with adults with collected historical data. In addition, measures like “age” or the “presence of children” are not as clustered or segregated as race/ethnicity or income, and so Census/ACS-based modeling at the small-area level are limited in their effectiveness. One could expect different results if one were targeting households based on race/ethnicity or language spoken at home, for example, as the Census/ACS may be very powerful for prediction.

While we did not observe many significant differences, we found listed households to be somewhat less disadvantaged than those who did not appear on any vendor list. Such a conclusion does suggest the need to have both unlisted and listed strata in household studies for both coverage and efficiency, with the unlisted strata expected to cover more low-income households.

Looking ahead, there are a few directions to broaden our current research. First, one could pursue other factors that may be predictive of higher incidence or hit-rate. Because age of children is difficult to capture, the presence of women under 40 or other covariates could be helpful. Second, it would be valuable to conduct a review of other vendors that may provide similar products to those we examined. Third, while we did not have a web option in our study, the future of survey research likely will need one and thus it would be valuable to understand the impact of using targeted lists in web surveys.

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