

Approaches to Solving the Wireless-Only Problem in Household Telephone Surveys

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June, 2010

The Issue

Over the past few years the proportion of the US adult population with a cell phone but no landline phone has been steadily increasing. Current estimates from the [National Health Interview Survey \(NHIS\)](#), the gold standard on this topic, indicate that as of December, 2009 almost one in four US adults has become “wireless-only.” This is a dramatic increase from the 2004 estimate of just over 4 percent. The largest share of these wireless-only adults is clustered among the younger demographic (18-35 years old), although the proportion of adults 30 and older without a landline also has increased. In addition to being a younger group than the population at large, wireless-only adults also are more likely to earn less, rent rather than own their homes, and live in non-family households with other adults.

In 2007, the NHIS began to measure a new behavior characterized as ‘wireless-mostly.’ These are people who have a landline phone but receive all or almost all of their phone calls on their cell phone. The NHIS estimates that at the end of 2009, 15 percent of US adults were wireless-mostly. Like the wireless-only, this group clusters in the younger demographic.

The implications for survey research are significant. Perhaps as many as 40 percent of adults may be either impossible or at least difficult to reach via traditional, landline-based telephone data collection methods. This in turn raises a number of troubling questions: Can surveys using this method still be valid? Are the estimates derived from traditional telephone sampling and data collection techniques accurate representations of the population?

The empirical research needed to answer these questions continues to evolve but the overall theme is that as the wireless-only population grows so does the potential for bias. Keeter, Kennedy, Clark, Tompson and Mokrzycki (2007) measured the differences between landline and wireless-only samples in a 2006 survey and concluded that with the proper demographic weights only a minimal amount of bias is introduced in estimates for the total population when wireless-only respondents are excluded. This was due both to the relatively small proportion of the total population that was wireless-only at that time and the similarities in attitudes within the demographic group with the highest proportion of wireless-only respondents, that is, young adults. More recently, Mokrzycki, Keeter and Kennedy (2009) in an analysis of 2008 exit poll data found substantial differences in voter preferences between wireless-only voters and the rest of the population. Further, they found that those differences were not corrected by standard demographic weighting. They conclude that as the wireless-only population grows standard weighting techniques will no longer be able to correct for the bias introduced by excluding the wireless-only population from survey samples.

The case of wireless-mostly seems to be a bit different. Boyle, Lewis, and Teft (2009) conducted a survey in which they called both landlines and cell phones. They found 16 percent of respondents who claimed to be wireless mostly. However, of these only about one quarter (4 percent of the total sample) said that it was very unlikely or not at all likely that their landline phone would be answered if it rang when someone was at home. In other words, about three quarters of the wireless-mostly population is still reachable by landline.

In addition to these statistical issues there also is a matter of public perception of survey validity. There has been substantial coverage of the wireless-only problem in the popular media and one result has been growing suspicion of polls and surveys that do not include cell phones. And so it may be necessary to include cell phones in survey samples in order for a survey's results to be viewed as credible.

All things considered, we believe that the widespread use of cell phones in the US population now requires that telephone surveys employ a dual frame design that samples both landlines and cell phones if the goal is to accurately measure attitudes and behaviors in the general population.

Operational Challenges

Including cell phones in a telephone study poses a number of statistical and operational challenges, many of which have been discussed at some length in the AAPOR white paper, [Guidelines and Considerations for Survey Researchers When Planning and Conducting RDD and Other Telephone Surveys in the U.S. With Respondents Reached via Cell Phone Numbers](#). In addition, ESOMAR recently has released just released their [Guideline on Research Via Mobile Phones](#). These documents explore the issues in considerable detail. Here we focus on four specific challenges:

1. FCC rules in support of the Telephone Consumer Protection Act of 1991 forbid the use of automated dialers when calling cell phones. Thus, known cell numbers must be dialed manually, degrading the efficiency of the calling effort and raising costs.
2. The link of area code and telephone exchange to a specific geographic area is much less reliable for cell phones than for landlines. In general, it is not possible to geographically target cell phone sample to the same degree of precision as landlines. For example, landlines can often be targeted in an efficient and affordable fashion for areas that are based upon a modest number of zip codes. In general, cell phones samples can only be efficiently targeted at much larger areas, typically states or

very large metropolitan areas. When studies require that respondents live in specific geographic areas the screen costs for the cell phone portion of the sample can be substantial.

3. Unlike landline telephones, cell phone owners generally incur charges for incoming calls, such as a survey request. As a consequence, compensation should be offered to respondents. However, the evolving structure of calling plans has substantially reduced the cost risk to respondents and in our experience few respondents ask for compensation.
4. Because of the portable nature of cell phones interviewers can sometimes reach respondents in circumstances where doing an interview might be dangerous (e.g., driving a car), inconvenient (e.g., at work or exercising), and where concentration or confidentiality is compromised (e.g., in a public place with other people close by). These possibilities also mean that additional screening is necessary and more call backs may be required.

With the right survey design and proper calling procedures all of these are manageable.

Procedures for Inclusion of Cell Phones

We suggest two approaches to including cell phones in survey samples, depending on the study design.

List Samples of Customers

Both wireless-only and wireless-mostly individuals sometimes provide their cell numbers to companies with whom they do business and these numbers can be used for survey purposes such as customer satisfaction research. Samples drawn from these customer files typically include cell phone numbers. In these instances, we recommend the following:

1. Determine the proportion of cell phones that exist within the sample frame, that is, the customer list.
2. Sample both landline and cell phone numbers in the same proportion as they exist in the original list.
3. Dial both sets of numbers, the cell phones being dialed manually.

4. Combine the landline and cell phone completed interviews, and weight the entire dataset to reflect the demographic and cell phone distribution within the original list.

Based on our experience to date the cost of calling cell phones in a customer list can approach twice that of calling landlines, although it generally is somewhat less than that. The magnitude of increase in the overall cost of the survey depends on the proportion of cell phones in the sample.

RDD Sample

The procedure for RDD samples is somewhat more difficult and potentially more costly.

1. Use two sample frames:
 - The standard RDD frame containing telephone exchanges assigned to landline numbers.
 - A supplemental frame containing telephone exchanges associated with cell phones.
2. Select a sample such that the proportion of cell phone numbers is no less than 15 percent of the total.
3. Dial both sets of numbers, the cell phones being dialed manually.
4. Set a minimum quota for completes from the cell phone frame that is no less than 10 percent of the total or a minimum of 50 completed interviews.
5. If necessary, screen for the specific geographic area.
6. As part of the survey process, determine the telephone status of each person/household (i.e. landline only, cell phone only, mixed).
7. Combine the landline and cell phone completes and weight the data based on demographic and telephone status.

The proportion of cell phone numbers in the sample and the quota set for cell phone completes in steps 2 and 4 above are recommended minimums. When there

is reason to believe that the proportion of wireless-only in the target population is high it may be appropriate to sample more cell numbers and set a somewhat higher quota. However, there also are important cost implications and these parameters should be carefully considered.

Other Options

Given the problems that the wireless-only population has created for telephone research, people often question if migrating research from the phone to the Web might be an appropriate solution. Can conducting a study in whole or in part on the Web help ensure that the wireless-only population is included in the survey? There are several limitations to making this change in methodology.

First, few companies have email addresses for all of their customers and there may be important differences in attitudes and behaviors between those with email addresses versus those without, and those differences could lead to substantial bias, that is, inaccurate estimates of actual customer opinion.

Second, while it might be tempting to implement a mixed mode design where some respondents complete by Web and others by phone there is the strong possibility that any differences in results across the two modes might not be real but only due to differences in survey method. A number of studies have shown that people sometimes answer differently in surveys administered orally by an interviewer versus self-administered by Web. And, of course, concerns about differences between those with email addresses versus those without remain.

Finally, there is the option to not use the customer list and instead use one of many commercial online panels to screen for customers. While this sometimes can be less expensive than telephone, there are two significant sources of bias in use of these panels. One stems from the fact that only about two thirds of U.S. households have Internet access and therefore can be reached by Web. The other is that all online panels rely on volunteers recruited by a wide variety of methods, that is, they

use a nonprobability design. The bias created by this noncoverage on the one hand and the volunteer/self selection recruitment process on the other is impossible to measure and correct. Thus, these samples do a poor job of accurately measuring attitudes and behaviors in the general population.

Recommendations

The wireless-only problem has now reached a significant enough level where most researchers believe that the only way to produce accurate estimates from telephone surveys is by using a dual frame sample design that includes both landlines and cell phones. Scientific evidence aside, the issue has drawn so much attention in the media that survey which excludes cell phones may be viewed as invalid. So even though the scientific evidence thus far suggests that the impact of not including some portion of the wireless only population may vary depending on the target population and/or the topics being studied including cell phones in the sample nonetheless seems like the wise course.

Alternatively, one might design an experiment to measure the impact of not including cell phones given the target population and survey topic. We believe that this kind of evidence-based decision making is essential if the ongoing validity and credibility of the research is to be maintained.

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