

A Revised Review of Methods to Estimate the  
Status of Cases with Unknown Eligibility

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As the American Association for Public Opinion Research (AAPOR) addresses in Standard Definitions (AAPOR, 2008), the calculating of response rates depends in part on estimating the proportion of cases of unknown eligibility that are in fact eligible. This rate is part of the formula for response rate 3 (RR3) and is designated as "e". Calculating "e" applies to all types of surveys, but has been of particular concern in random digit dialing (RDD) telephone surveys since a) response rates to RDD surveys have been falling, b) the number of calls needed to secure a given response rate has been rising, and c) despite equal or greater field efforts, the proportion of numbers with unknown status has been increasing (Brick et al., 2003; Curtin, Presser, and Singer, 2005; Kennedy, Keeter, and Dimock, 2008; Murray et al., 2003; Piekarski, 1999; Piekarski, 2003; Son and Gwartney, 2003; Steeh et al., 2001).

This paper will examine 1) methods for calculating eligibility rates, 2) features of sample and survey design that influence "e", 3) actual estimates of "e" that have been calculated, and 4) using geographic information to examine eligibility. Most attention will focus on the case of RDD telephone surveys since almost all of the literature deals with such studies.<sup>1</sup>

### **Methods of Calculating Eligibility Rates**

Several different methods have been proposed to calculate "e": 1) minimum and maximum allocation, 2) proportional allocation or the CASRO method, 3) allocation based on disposition codes, 4) survival methods either using a) number of attempts only or b) number of attempts and other attributes of the sampled cases, 5) calculations of the number of eligible respondents, 6) contacting telephone business offices, 7) linking to other records, and 8) continued attempts to contact.

The minimum and maximum allocation method simply takes the cases of unknown eligibility and assumes that either 0% or 100% are eligible (Butterworth, 2001; Lessler and Kalsbeek, 1992; Lynn, Beerten, Laiho, and Martin, 2002; McCarty et al., 2006; Smith, 2003). This is useful in determining the upper and lower bounds for the response rate. Under Standard Definitions the 100% eligibility assumption produces the minimum response rate (R1) and the 0% eligibility assumption yields the maximum response rate (R5). The limitation is that often the unknown eligibility level is so large that the possible range of response rates is great. In RDD national surveys the range is usually greater than 10 percentage points and can go as high as 25 percentage points (Brick et al., 2003; Currivan et al., 2004; Harvey et al., 2003; Kennedy and Bannister, 2005; Lessler and Kalsbeek, 1992; Lynn et al., 2002; Montaquila and Brick, 1997; Murphy and O=Muircheartaigh, 2003; Nelson et al., 2004; Nolin et al., 2000; Raiha, 2004; Smith, 2003).

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<sup>1</sup> For an example for an in-person survey see Slater and Christensen, 2002 and for postal surveys see Harvey et al., 2003; Link et al., 2008. For use with cell phones see Callegaro et al., 2007.

Quick-turnaround surveys with minimal contacts per case will often have even higher rates. In postal surveys unknown cases, consisting mainly of mail outs with no response from either households or the postal service, can also be substantial. In-personal surveys tend to have fewer unknown cases unless screening is involved. For all survey modes, when screening for a small sub-population is involved, the range can easily exceed 50 points (Ellis, 2000).

The proportional allocation or CASRO method assumes that the ratio of eligible to not eligible cases among the known cases applies to the unknown cases (Beaudoin, 2007; Behavioral..., 2002; Butterworth, 2001; Ellis, 2000; Ezzati-Rice et al., 2000; Frankel, 1983; Hembroff et al., 2005; Hidiroglou, Drew, and Gray, 1993; Jang et al., 2007; Lessler and Kalsbeek, 1992; Link et al., 2004; Raiha, 2004; Schwartz et al., 2004; Strouse, Carlson, and Hall, 2003). It has the advantages of being easily calculated from information readily available from each individual survey and being conservative (i.e. producing a high estimate of the eligibility rate and thereby not inflating the estimated response rate). Its ease, availability, and conservative leaning is why it is the method used in AAPOR's on-line response rate calculator ([www.aapor.org/uploads/Response\\_Rate\\_Calculator.xls](http://www.aapor.org/uploads/Response_Rate_Calculator.xls)).<sup>2</sup>

But its conservative nature is in effect a biased overestimate of the eligibility rate. It overestimates eligibility because it assumes that the unknown cases have the same attributes as the known cases, when the one fact that is known about the known and unknown groups is that they differ on the resolution dimension. Moreover, this method also assumes that the proportion eligible in the unknown group is unrelated to the number of attempts made to resolve the status of the unknown cases. Take the case of RDD surveys of households. Eligible cases (e.g. working, residential numbers) can be identified by contact attempts and more attempts identify more of them. Non-eligible cases that represent working, non-residential numbers (e.g. businesses) can be likewise identified by attempts. But non-assigned numbers with ringing tones cannot be resolved by attempts and thus make-up a larger and larger share of unknown cases as the eligible and not eligible cases are identified and removed from the unknown category. Likewise, non-voice lines going to either residences or non-residences and used exclusively for computers, faxes, or other non-voice purposes have every little chance of being resolved by attempts and will also make up a larger share of the unknown group as other cases are resolved as eligible or ineligible. Thus, the proportion of eligible cases among the unknown cases will fall given more attempts to establish the status of telephone numbers. Most likely the greater the proportion of cases resolved, the less

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<sup>2</sup> Standard Definitions' basic admonition (2008) is that "in estimating e, one must be guided by the best available scientific information on what share eligible cases make up among the unknown cases and one must not select a proportion in order to boost the response rate." Proportional allocation does the latter, but it is doubtful it does the former.

like the known cases the unknown cases will be and thus the greater the overestimate bias in the proportional allocation method (Curtain, Presser, and Singer, 2005; Frankel et al., 2003; Groves and Lyberg, 1988; Keeter et al., 2000; Sebold, 1988; Steeh et al., 2001). The same situation should prevail for surveys in other modes as well.

Allocation based on disposition codes is used in various ways to calculate the eligibility rate.<sup>3</sup> The simplest way uses disposition codes alone to determine whether a case is eligible or not (Adult..., n.d.; Ellis, 2000). For example, the Adult Tobacco Surveys (ATS) has about 14 final disposition codes for cases of unknown eligibility and assumes that those involving answering machines, quick hang-ups, technological barriers, and certain other circumstances are all eligible and those involving all ring-no-answers and/or busy signals are all not eligible (Adult..., n.d.). One problem with this approach is that there appears to be little or no empirical basis for the differential allocation. Another difficult is that there is little consensus on how certain dispositions should be handled. For example, Currihan et al., (2004) counted all answering machines cases eligible, Brick et al., 2003 treated them as all unknown, and AAPOR (2008) suggests that they should be assigned as eligible, ineligible, or unknown based on the content of the recorded message.<sup>4</sup>

A more refined version takes the disposition status of the unknown cases (e.g. ring-no-answer cases vs. indeterminant-answering-machine cases) and estimates eligibility for each case based on disposition-specific, internal or external evidence (Kennedy, Keeter, and Dimock, 2008).

A related approach is to use gridout procedures to assign cases. Gridout procedures stipulate that cases must be attempted a minimum number of times during certain time slots and days of the week for some minimum period of time. If this procedure has been fulfilled and the case remains unknown, then its disposition code plus its completed gridout status might be used to classify the case as ineligible (Eckman, O'Muircheartaigh, and Haggerty, 2005). While a rigorous gridout approach with many call attempts does reduce the number of eligible cases among the still unknown cases to a low level, it does not reduce it to zero as the disposition-based approach assumes and less rigorous forms of gridout would lead to even more misclassification. Gridout procedures are most frequently used for telephone surveys, but are applicable for in-person surveys as well. They do not readily apply for postal surveys.

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<sup>3</sup>On how call-specific disposition codes are use to assign final disposition codes, see AAPOR, 2008 and McCarthy, 2003.

<sup>4</sup> On differences between answering machine cases and ring-no-answer and related cases see Brick et al., 2003.

Survival analysis methods use attempt-specific outcomes and the assumptions of standard survival analysis to estimate the proportion of cases eligible among the remaining unknown cases (Brick et al., 2002; Frankel et al., 2003; Minato and Luo, 2004; Sangster and Meekins, 2004; Strouse, Carlson, and Hall, 200; Tucker and Lepkowski, 2008). The simplest method uses only the attempt-specific outcomes to calculate the survival curve and thus the eligibles among the remaining unknown cases. A more elaborate model partitions cases based on other known attributes such as whether they are a listed or unlisted number. This conditional approach then calculates survival analysis on the separate sub-groups and combines results for an overall eligibility rate (Brick et al., 2002).

Like the proportional allocation method, the survival analysis method only needs data regularly collected as part of a survey. However, it uses more information than the CASRO method utilizes and in theory should be better able to model and estimate the eligibility rate than the former method.<sup>5</sup> The limitations are that 1) it is uncertain how well the statistical assumptions of survival analysis (e.g. that telephone numbers are censored randomly) are actually met, 2) sample sizes used in the estimates may get too small with smaller samples or when much sub-setting is used, 3) it is a fairly complex statistical procedure to carry out, and 4) the application of survival analysis to this problem is relatively new and as Brick et al. (2002) note, "we have not yet had sufficient experience to adequately predict the conditions that result in unstable estimates." Similarly, Strouse, Carlson, and Hall (2003) express concern that estimates are "too sensitive to small changes in assumptions affecting the calculation of residency for unresolved cases under the survival method." The potential instability in the method is illustrate by the two examples reported by Brick et al., 2000. For the 1999 National Educational Survey the estimated eligibility rates were 21.1-24.2% (for respectively the general and conditional methods), but for the National Survey of America's Families (NSAF), it was 5.1%-5.8%. Different survey designs probably contribute to this large difference in estimates across the two surveys, but the magnitude of the differences in the estimated eligibility rates is problematic especially since the very low NSAF estimates have not been replicated in subsequent surveys (Brick, 2003).

Among the attributes of numbers that have proven to be most effective in distinguishing working from not working numbers are whether the numbers are listed or not and the final dispositions of the unknown cases (e.g. rings-no-answers vs. answering machines) (Ellis, 2000; Frankel et al., 2003; Shapiro et al., 1995). For example, Ellis (2000) found that 57% of resolved eligible cases were listed as were 47% of answering-machine unresolved cases and 12% of unresolved ring-no-answer/busy cases.

The survival analysis method would apply equally well for in-person surveys. It is less clear how well it would work for most

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<sup>5</sup>As Brick et al., 2000 describe, in one set of circumstances the two methods produce identical estimates.

postal surveys with a much more limited number of attempts or mailings per case.

Calculations can be made of the proportion of cases in a sample frame that would be eligible respondents. For example, the calculation-of-number-of-telephone-households method compares estimates of the number of telephone households from an RDD survey to estimates of telephone households from other sources such as the Census, in-person surveys, and telephone companies and governmental communications agencies (Beyerlein and Sikkink, 2008; Butterworth, 2001; Frankel et al., 2003). If the telephone survey produces an estimated number of telephone households lower than the external, benchmark standard, then one calculates how many of the unknown cases must be eligible cases to account for the shortfall of households. If the telephone survey produces an estimate equal to (or exceeding) the external figure, then none of the unknown cases are deemed to be eligible. This method depends on having a good, external standard and the proper calculation of sampling estimates. It also hinges on the sampling variances in the survey and external estimates and in smaller surveys in particular the former would be large and the danger of misestimates high. Similarly, evidence from the Census and Annual Housing Survey can be used to estimate the number of occupied housing units in a general population, postal survey (Link et al., 2008). For in-person survey, field observations can usually ascertain the nature and occupancy of almost all sample addresses, but results from the Census can check and augment these results.

Three methods that use case-specific, auxiliary information are the telephone business-office, record-linkage, and continued-contacting approaches. Under the business-office approach at end of or sometimes after the field period, local, telephone, business offices are contacted and asked the status of individual unknown numbers (Curriivan, et al., 2004; Frankel et al., 2003; Groves, 1978; Haggerty, 1996; Massey, 1980; Massey, 1995; Montaquila and Brick, 1997; Nicolaas and Lynn, 2002; Nolin et al., 2000; Sebold, 1088; Shapiro et al., 1995; Smith, 2003; Strouse, Carlson, and Hall, 2003). This approach naturally only applies to telephone surveys.

The chief advantage of this method is it offers the possibility of obtaining definitive, case-level information on the status of unknown cases. But the method has many limitations. First, it has appreciable extra costs and takes extra time since one must follow-up with either all unknown calls or a random sample of same with the telephone companies after the survey is completed. Second, it is possible to obtain information on only a sub-set of the unknown cases. Business offices will often decline to provide information about telephone numbers. As Table 1 indicates studies report that between 12% and 55% of the unknown cases could not be resolved by this method. The difficulty of obtaining information from business offices has led some researchers to abandon this approach (Curtain, Presser, and Singer, 2005; Groves and Kahn, 1979; Wooley, Kuby, and Shin, 1998). Third, the method does not always yield accurate information. At best it tells one if a telephone number pays a residential rate. This does not ensure that it is a voice line (Frankel et al., 2003) or that it is attached to an occupied household. For example, in Italy the level

of non-contacts is strongly associated with the number of secondary houses in a region, thereby suggesting that many unanswered numbers are reaching unoccupied residences (Iannucci, Quattrociochi, and Vitaletti, 1998). Also, the calls to business offices are usually carried out several weeks to months after the end of a field period. It does not appear that these follow-up calls have determined the status of telephone numbers during the survey period (Sebold, 1995; Shapiro et al., 1995).<sup>6</sup> Finally, some studies have found that business offices often give out incorrect information about the status of numbers. For example, Shapiro et al. (1995) found that "in at least 38% of the cases in which the business [office] classified a number as residential when the survey classified it otherwise, the business office was wrong or the interviewer recorded the answer incorrectly...[and] (w)hen the business offices classified the number as nonworking at least 36% of their determinations were incorrect." However, it is unclear on what basis these judgments were made or how differences in time period were handled.

The second follow-up method is to link individual sampled cases (e.g. telephone numbers and/or addresses) to databases that can shed light on their eligibility status. Harvey et al., (2003) in a mail sample linked cases to telephone and city directories to determine the eligibility status of cases. Many other records can also be linked to addresses (Smith and Kim, 2009). With samples of telephone numbers the most fruitful records to link to would be telephone directories and other databases with telephone numbers recorded.

This technique is largely untested. Studies have shown a correlation between directory status and eligibility in the aggregate, but this has not typically been used to determine the eligibility status of specific cases (Brick et al, 2003; Minato and Luo, 2004). Work by Smith and Kim (2009) shows that about 96% of a national sample of addresses has city-style addresses that can be linked to other databases and for about 90% of these linkable addresses some useful information about the households can be obtained. Kennedy, Keeter, and Dimock (2008) found that 44% of unknown number in a national RDD were deemed as associated with eligible households based on links to a large commercial database. Thus, the likely occupancy status of the vast majority of addresses can be ascertained via unobtrusive, database searches.

The third follow-up method is the continued-contacting approach under which the unknown cases or a random sample of same are followed up with additional attempts after the end of the field period (Frankel et al., 2003; Groves, 1978; Kennedy, Keeter, and Dimock, 2008; Sebold, 1988; Sangster, 2003). As with the business-office and record-linkage approaches, this has the advantage of potentially determining the

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<sup>6</sup>As Standard Definitions (AAPOR, 2008) indicates, "Surveys should define a date on which eligibility status is determined. This would usually be either the first date of the field period or the first date that a particular case was fielded." Thus, what the business office contact needs to determine is whether the number was eligible at the appropriate point in time.

status of individual cases. It also has some of the similar drawbacks. First, it is costly in time and money, especially if all cases or a large sample is followed up. Second, even allowing for dozens of additional attempts over a long, follow-up period will not resolve many cases. As Table 1 shows, for RDD surveys 17-83% of numbers were still unknown after the follow-up calls. Third, as far as can be told, the method has not been used to determine the eligibility of calls at the original status date, but rather at the point of eventual contact weeks or even months later. Strictly speaking this does not resolve the eligibility issue. In general, the follow-up approach has used the same mode as the original study to carry out the post-survey follow-ups. However, a mixed-mode approach that used other modes for the follow-ups would work also (Westrick and Mount, 2009).

Of course these different methods can be used together. Either the different methods can be separately applied and their estimates compared (e.g. Brick et al., 2002; Butterworth, 2001; Frankel et al., 2003; Lynn et al., 2002; Montaquila and Brick, 1997; Nolin et al., 2000) or two or more methods can be applied to produce a single estimate. For example, both follow-up attempts and checking databases can be used to resolve unknown cases. Also, after using one or both of the follow-up methods, one might estimate eligibility by proportional allocation to the remaining unresolved cases or by the minimum/maximum procedure (Kennedy, Keeter, and Dimock, 2008; Nicolaas and Lynn, 2002; Smith, 2003). Similarly, partitioning cases by listing status could not only be used in survival analysis, but in follow-up or proportional allocation methods. For example, Ellis (2000) proposes an estimate in which the proportional allocation is separately applied for listed and unlisted cases.

### **Sample and Survey Design and Eligibility Rates**

Several aspects of sample and survey design influence the eligibility rate. Taking RDD surveys as an example, eligibility rates will be higher if a) the initial sample of numbers is pre-screened more extensively and/or b) fielded numbers are worked less extensively. Pre-screening efforts that will increase the eligibility rate include a) selecting blocks of numbers with more listed numbers in them, b) eliminating business numbers by cross-checking white and yellow page listings and dropping those that occur only in the later or by other database methods, and c) automatically pre-calling numbers for working tones (Battaglia et al., 1995; 2004; Brick et al., 2000; Brick et al., 2003; Piekarski and Cralley, 2000). During the field period, the eligibility rate for the unknown cases will fall as cases are worked for longer periods and with greater efficiency (Cunningham, Martin, and Brick, 2003; Frankel et al., 2003; Keeter et al., 2000; Sebold, 1988; Steeh et al., 2001). More calls, a longer calling period, and more effective calling (spreading calls across different days and different times) will all reduce the proportion of eligible number among the residual of unknown cases.

### **Estimates of "e" That Have Been Calculated**

When the differences from the various methods described above are coupled with differences resulting from the design and execution of the survey design, the range in estimated eligibility rates is huge even if one ignores estimates under the minimum and maximum approach. Depending on how the remaining unknown cases are allocated, the follow-up methods produce estimates ranging all the way from 5% to 88% (Table 1), survival methods have yielded estimates of 5%, 6%, 20%, 24%, and 35% (Brick et al, 2002; Frankel et al., 2003), and other methods produced figures from 10% to about 77% (Butterworth, 2001; Curriuan et al., 2004; Curtain, Presser, and Singer, 2005; Ellis, 2000; Hembroff et al., 2005; Keeter et al., 1998; Keeter et al., 2000).

As alluded to in the discussion of methods above, the proportional allocation method produces high, upwardly-biased estimates of "e". Follow-up methods also tend to yield fairly high estimates, although this in large part depends on how the residual unknown cases are handled. The survival method tends to produce the lowest figures. In some instances the survival method produces sufficiently lower estimates than the follow-up methods do that one would have to assume a large overreporting of eligibility by the telephone-business-office and/or continued-contacting approaches, underestimating by the survival analysis, or some combination of these. The former could be possible due to failure to reconcile time periods, misreporting from telephone business offices, or misattribution of eligibility based on information from business offices. The latter could stem from underlying assumptions of survival analysis not being met.

### **Using Geographic Information to Understand Eligibility**

While information on individual sample units (e.g. addresses, telephone numbers) will often be lacking, in general local area, aggregate-level information for the sample units will often be available. For example in RDD surveys, besides looking at the status of numbers by their telephone attributes (listed/not listed; number of listed numbers in the same block of numbers, reason for non-contact, etc.), they can also be examined by the geographic areas in which they are located and the attributes of those areas (Johnson and Cho, 2004; Kennedy and Bannister, 2005). Looking at area alone, unknown numbers in the US are more common in the Northeast and Pacific coast than in the South or Midwest (Montaquila and Brick, 1997; Nolin et al., 2000) and in Italy they are more frequent in areas with many secondary households (Iannucci, Quattrociochi, and Vitaletti, 1998). Also, in the US they are higher in metropolitan areas in their own county and lowest in non-metropolitan counties (Montaquila and Brick, 1997; Nolin et al., 2000; see also Steeh et al., 2001). Unknown numbers are also higher in areas with more educated people, wealthier areas, places with more renters, and neighborhoods with fewer children (Montaquila and Brick, 1997; Nolin et al., 2000).<sup>7</sup>

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<sup>7</sup>Of course telephone number portability will undermine the use of geographic data tied to telephone numbers.

The higher unknown rate for different areas will mean, all others things being equal, that these areas will be under-represented in the realized sample. This might be due to there being fewer eligible numbers per sampled numbers, to a lower response rate, or some combination of these factors. The former would be more the case if the unknown case were predominately not eligible and the later if they were uncontacted, eligible households.

In addition, geographic variables representing telephone exchange areas could be linked to variables on the known characteristics of telephone numbers (e.g. listed/not list), and the call histories of cases to produce predictive equations for assigning unknown cases as eligible or ineligible.

For address-based sampling with postal and in-person surveys there is usually Census-based data on the localities from which the sample cases are drawn. This can of course be used to ascertain the aggregate-level correlates of cases of unknown eligibility.

### **Summary**

While there are several useful ways to estimate the status of unknown cases to calculate "e", each has notable limitations. The minimum-maximum method typically produces a very wide range in estimated response rates; the proportional-allocation method overestimates "e" and thus underestimates response rates; follow-up methods are time-consuming and expensive, usually do not take time into consideration, and for that and other reasons may rest on inaccurate data or wrong inferences from the available information; estimates of eligibility levels such as those using telephone household estimates may be too imprecise due to sample variance and imperfect external standards, and survival analysis rests on unproven assumptions and perhaps unstable data. At present none can be considered a gold standard for the calculating "e". As a result, researchers should use multiple methods to estimate "e" and ultimately calculate the response rate and report a range in the later when estimates of "e" vary.

In addition, existing methods can be improved. The follow-up methods would greatly benefit from a) taking time into consideration in establishing eligibility and b) more careful and circumspect use of the information obtained from telephone companies. In addition, telephone companies have much more information on telephone numbers than they have been willing to share and the business-office method would greatly benefit if telephone providers would be willing to share more information under conditions that would maintain privacy (e.g. by making certain assessments themselves following assignment rules created by survey researchers). Likewise, databases have been used in only a few studies and not rigorously analyzed to date. Survival analysis needs to be applied to more surveys so its robustness can be better judged and should be tested against criterion data (e.g. can survival analysis accurately estimate eligibility rates in a survey of 100% known cases when only results from the first half or two-thirds of outcomes are used in the survival analysis?).

Even with triangulation and improved techniques, there will be

no simple answer to what "e" is. There is no general eligibility rate that can be applied to all or even most surveys. The eligibility rate will depend on aspects of sample and survey design and execution and will have to be calculated separately for each and every survey. Still, surveys with comparable designs and executions should produce similar estimates of "e" so that some design-specific, expected rates might eventually be determined. This might allow for some to adopt a reasonable estimated "e" when their surveys do not have their own estimates of "e" from follow-up methods or other approaches.

To improve our understanding of "e" and therefore of response rates, more research is needed. One useful tack would be a meta analysis comparing techniques across a large number of studies. A second study design would involve collecting detailed information from in-person surveys on the number and use of telephones and telephone-related technologies (modems, faxes, call screening devices, etc.) within households.<sup>8</sup> A third approach would involve specially-designed collaboration studies between survey researchers and telephone companies in which complete, detailed, accurate, and timely information going well beyond the partial, limited, questionable, and dated information now available from business offices about the unknown telephone numbers would be provided by the cooperating telephone companies so that the status of all unknown numbers could be determined. Finally, greater and more rigorous use of databases could greatly illuminate the status of both sampled addresses and telephone numbers (Smith and Kim, 2009). Through these and other research designs a more thorough understanding of "e" can be obtained.

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<sup>8</sup>See work done on the 2004 Current Population Survey (Morganstein et al., 2004; Tucker, Brick, and Meekins, 2007).

Table 1

## Studies of the Eligibility of Cases of Unknown Eligibility

Study	Method	# of Calls before Fol- low-up	Time be- for Fol- low-up	Eligible	Not Eligible	Still Unknown	N
1	CBO	11	1-4 weeks	28%	35	36	294
2a	CBO	12	--	--	95%	--	20
2b	CBO	17	--	53%	47	--	32
3a	AC	--	4 weeks	40%	40	20	266
3b	AC	20	up to 6 mos.	38%	44	17	239
4	CBO	20	1-3 weeks	44%	34	22	41
5a	CBO	11	3 mos.	18%	70	12	14624
5b	CBO	--	2 mos.	37%	48	15	124
6	CBO	14	--	10%	67	23	163
7a	CBO	10	--	23%	22	55	530
7b	AC	10	3 weeks	5%	12	83	530
8	AC	--	3 mos.	6%	16	78	708
9	CBO	14	1+ mos.	41%	--	--	600
10	AC	10	1 day-5 mos.	24%	28	48	592

CBO=Contact business office

AC=Additional calls

Studies: 1=Massey, 1981; 2=Groves, 1978; 3=Sebold, 1988; 4=Haggerty, 1996; 5=Shaprio et al., 1995; 6=Nicolaas and Lynn, 2002; 7=Frankel et al., 2003; 8=Sangster, 2003; 9=Brick and Broene, 1997; 10=Kennedy, Keeter, and Dimock, 2008.

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