Handling Duplicate Telephone Numbers in an Ongoing RDD Survey: The National Immunization Survey

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AAPOR 2002

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Abstract

The National Immunization Survey (NIS) measures vaccination coverage among children aged 19-35 months in the 50 states and 28 metropolitan areas in the U.S. The NIS is a random-digit-dial survey conducted by Abt Associates for the National Immunization Program and the National Centers for Health Statistics of the Centers for Disease Control and Prevention.

The quarterly sample includes "duplicates," defined as telephone numbers that have been in the sample in one of the previous four quarters and drawn again for the current quarter. In order to have a representative sample for the current quarter, duplicate cases must be called again.

Call outcome statistics for these cases—both for the current quarter and for the original release—have been computed and compared. It appears that respondents who reported eligible children in the first release are more likely to refuse before a determination of eligibility can be made in the duplicate release.

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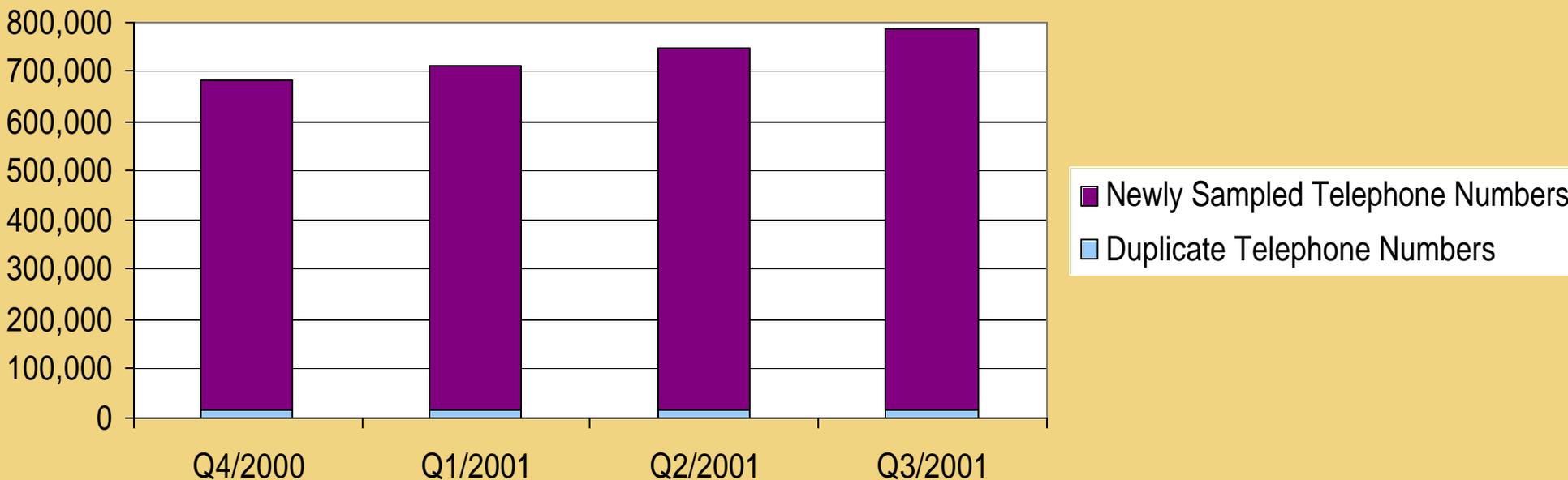
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The National Immunization Survey: Background

- Data collection conducted quarterly since April 1994.

- Sponsored by the National Immunization Program and the National Centers for Health Statistics, both of the Centers for Disease Control and Prevention.

- Measuring vaccination coverage of children aged 19-35 months in the 50 states, District of Columbia, and 27 metropolitan areas—the 78 Immunization Action Plan (IAP) areas.

- 3 million sample telephone numbers annually.

- 1 million households contacted each year.

- 35,000 children aged 19-35 months identified annually.

- For eligible households, interview consists of 4 sections: an immunization history, demographics, consent to contact the child's provider for shot record information, and topical modules relating to immunization.

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Sample for the NIS

- **Sample is drawn quarterly.**

- **Every quarter there are telephone numbers in the sample that were drawn in previous quarters.**

Newly Sampled and Duplicate Telephone Numbers in Sample by Quarter

Legend:
- Newly Sampled Telephone Numbers
- Duplicate Telephone Numbers

Y-axis: 0 to 800,000 (in increments of 100,000)

X-axis: Q4/2000, Q1/2001, Q2/2001, Q3/2001

Duplicate Telephone Numbers

Q4/2000 to Q3/2001

- **Duplicate Telephone Numbers are defined as telephone numbers that have been sampled and called during the preceding four quarters.**

- **Interviewers are notified when a batch of duplicate cases are released to the telephone center in order to be prepared for questions from respondents.**

- **Each quarter there are approximately 16,000 duplicate telephone numbers sampled.**

- **These cases compose roughly 2.2% of the total sample.**

- **The percentage of duplicate telephone numbers varies greatly by IAP area.**

- **IAPs with a higher percentage of duplicate telephone numbers are those with a large sample size relative to the population. IAPs with the highest levels of duplicate cases are smaller urban areas.**

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Percentage of Duplicate Cases in Sample by IAP
Q4/2000 to Q3/2001
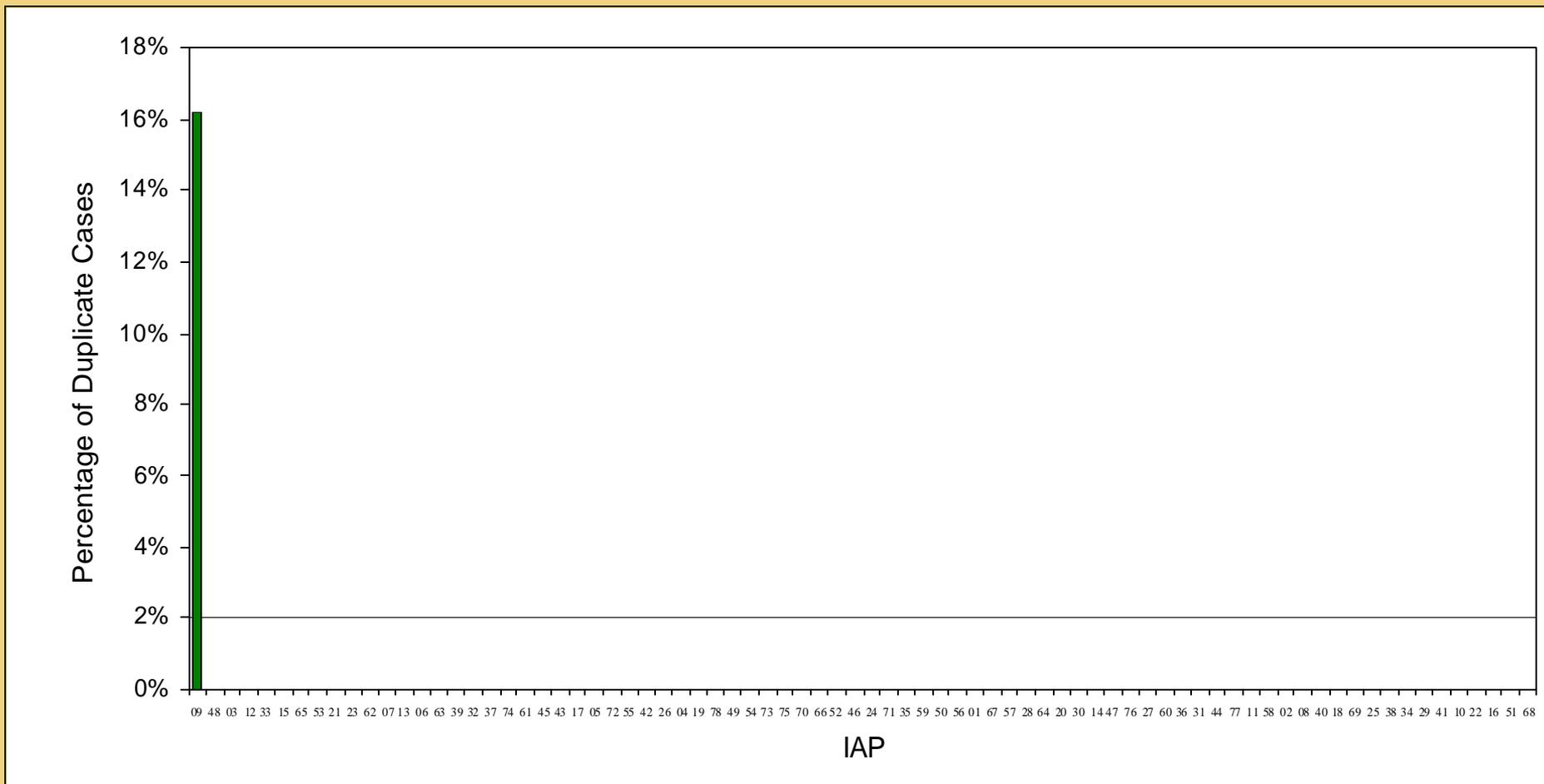
Performance of Duplicate Cases

Q4/2000 to Q3/2001

- Fewer eligible children are found in a sample of duplicate telephone numbers than in a sample of newly sampled telephone numbers.

- This is demonstrated by examining the call outcome statistic Percent of Eligible Households Rate (PEH):

$$\frac{\text{Number of Eligible Households}}{\text{Number of Eligible Households} + \text{Number of Ineligible Households}}$$

Examining PEH

Q4/2000 to Q3/2001

- **Percent of Eligible Households Rate is 3.61% for non-duplicate cases and 2.77% for duplicate cases—a statistically significant difference. That is, in the non-duplicate sample an average of 28 households have to be screened to reach one eligible household. However, an average of 36 households must be screened to find one eligible household in the duplicate sample.**

- **Since the proportion of duplicates in the total sample is small, there is little visible effect on the total sample PEH at 3.59%**
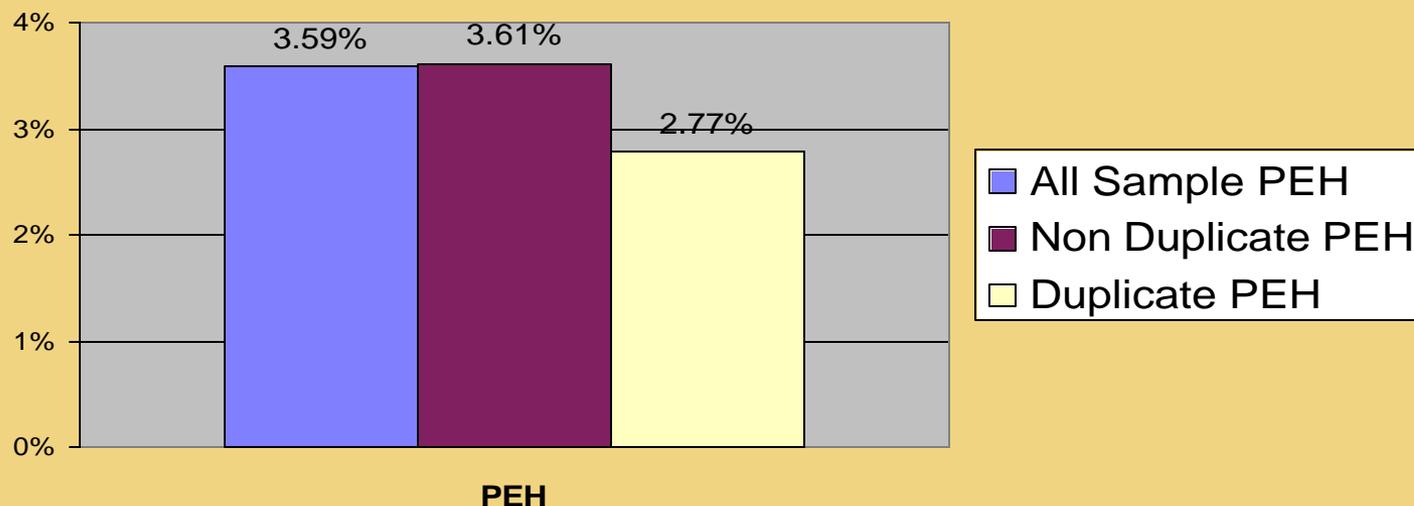
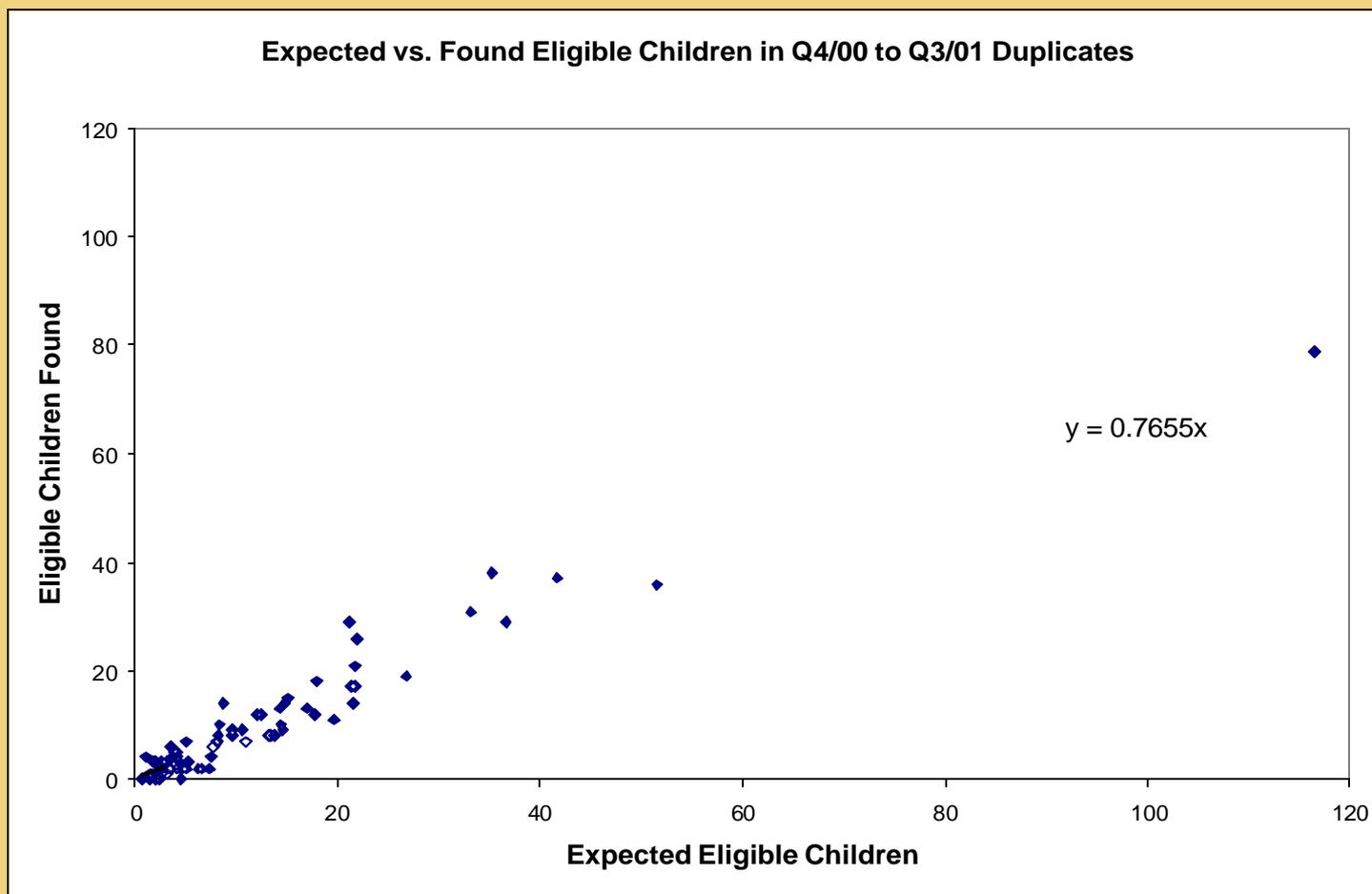# Expected versus Found Eligible Children

Q4/2000 to Q3/2001

- **Applying the non-duplicate PEH of 3.61% to the total screened households in the duplicate sample illustrates expected versus found eligible children.**

Expected and Found Eligible Children in Q4/2000 to Q3/2001 Duplicate Sample

Found Eligible Children — Expected Eligible Children
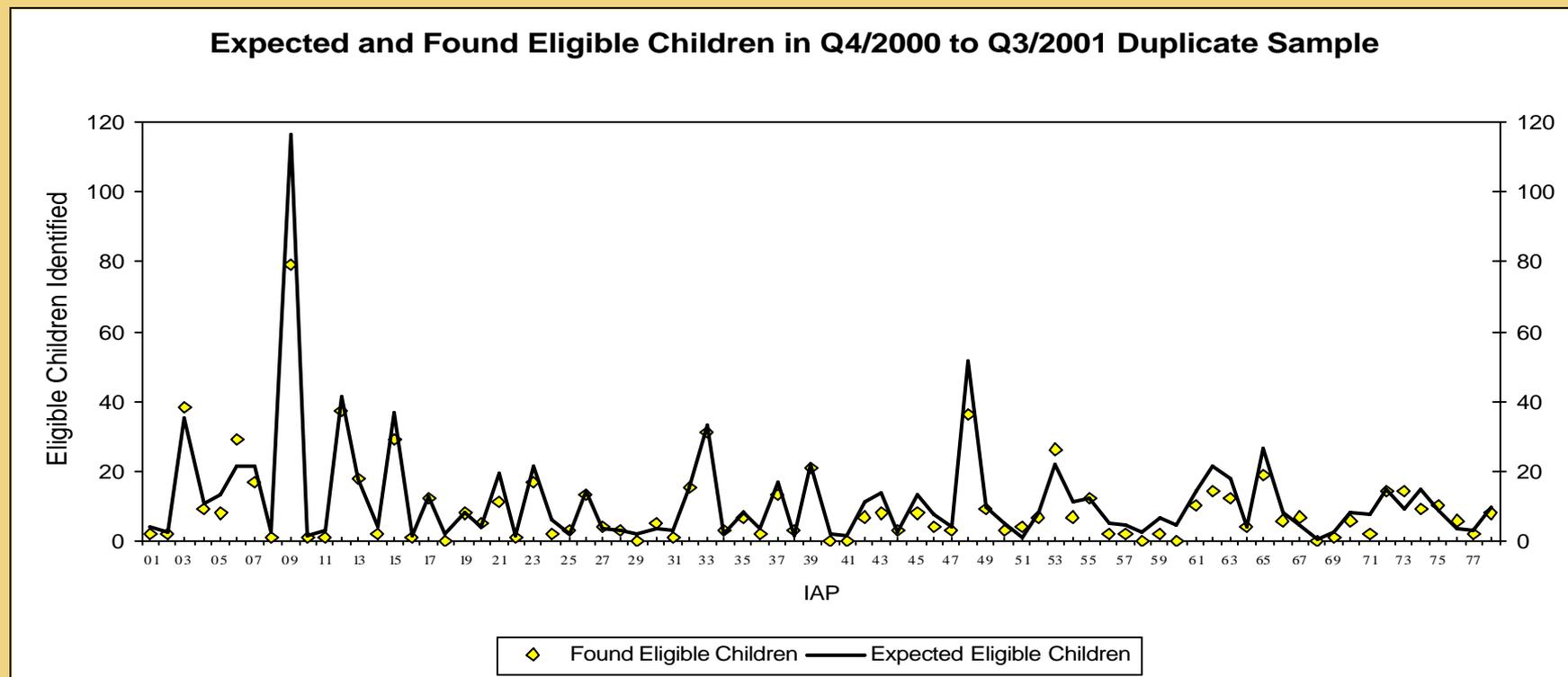
Expected versus Found Eligible Children

Q4/2000 to Q3/2001

- About 80% of the expected eligible children were found in the duplicate sample.

Expected vs. Found Eligible Children in Q4/00 to Q3/01 Duplicates

$y = 0.7655x$

X-axis: **Expected Eligible Children**

Y-axis: **Eligible Children Found**

A Duplicate Telephone Number's First Release

Q4/2000 to Q3/2001

- **For the first release of a duplicate during the four quarter period— before the case became a duplicate—eligible children are found as expected.**

Expected vs. Found Eligible Children in Q4/00 to Q3/01 on first release of duplicate cases

$y = 1.043x$

Eligible Children Found

Expected Eligible Children
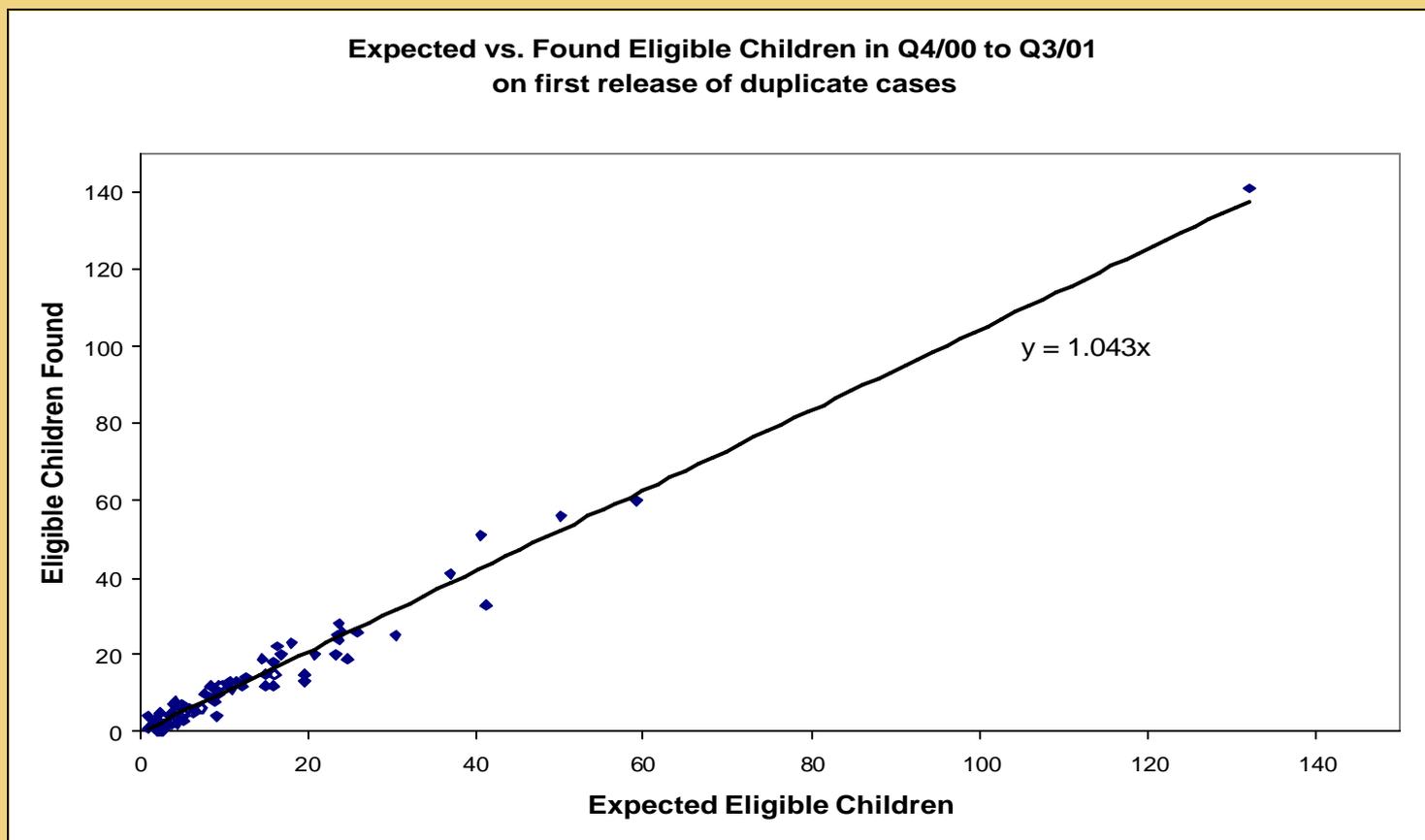
In Conclusion

- **These results indicate that respondents are more likely to refuse before a determination of eligibility can be made or screen out when sampled multiple times.**

- **Duplicate telephone numbers, while a small portion of the total sample, have an effect on production and rates.**

- **It is important to recognize the value of a duplicate telephone number to successfully manage a sample.**

For more information

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List of IAPs and Percentage of Duplicate Cases

IAP	Q4/2000 to Q3/2001 Percent of Sample that is Duplicates	IAP	Q4/2000 to Q3/2001 Percent of Sample that is Duplicates	IAP	Q4/2000 to Q3/2001 Percent of Sample that is Duplicates
01 Connecticut	0.80%	27 Kentucky	0.65%	53 TX-El Paso County	3.77%
02 MA-Rest of State	0.46%	28 Mississippi	0.75%	54 TX-City Houston	1.49%
03 MA-City of Boston	5.98%	29 North Carolina	0.28%	55 TX-Bexar County	1.96%
04 Maine	1.66%	30 South Carolina	0.69%	56 Iowa	0.84%
05 New Hampshire	2.03%	31 TN-Rest of State	0.59%	57 Kansas	0.79%
06 Rhode Island	3.21%	32 TN-Shelby County	2.74%	58 Missouri	0.47%
07 Vermont	3.42%	33 TN-Davidson County	5.59%	59 Nebraska	1.03%
08 NJ-Rest of State	0.45%	34 IL-Rest of State	0.29%	60 Colorado	0.64%
09 NJ-City of Newark	16.20%	35 IL-City of Chicago	1.06%	61 Montana	2.39%
10 NY-Rest of State	0.27%	36 IN-Rest of State	0.63%	62 North Dakota	3.43%
11 NYC-5 Counties	0.50%	37 IN-Marion County	2.61%	63 South Dakota	2.89%
12 District of Columbia	5.84%	38 MI-Rest of State	0.32%	64 Utah	0.74%
13 Delaware	3.32%	39 MI-Detroit	2.77%	65 Wyoming	4.91%
14 MD-Rest of State	0.66%	40 Minnesota	0.42%	66 AZ-Rest of State	1.30%
15 MD-City of Baltimore	5.18%	41 OH-Rest of State	0.28%	67 AZ-Maricopa County	0.79%
16 PA-Rest of State	0.26%	42 OH-Cuyahoga County	1.88%	68 CA-Rest of State	0.14%
17 PA-Philadelphia	2.09%	43 OH-Franklin County	2.26%	69 CA-Los Angeles	0.35%
18 Virginia	0.36%	44 WI-Rest of State	0.57%	70 CA-Santa Clara	1.31%
19 West Virginia	1.55%	45 WI-Milwaukee County	2.28%	71 CA-San Diego County	1.10%
20 AL-Rest of State	0.73%	46 Arkansas	1.18%	72 Hawaii	2.02%
21 AL-Jefferson County	3.68%	47 LA-Rest of State	0.66%	73 Nevada	1.47%
22 FL-Rest of State	0.27%	48 LA-Orleans Parish	7.83%	74 Alaska	2.54%
23 FL-Duval County	3.49%	49 New Mexico	1.50%	75 Idaho	1.41%
24 FL-Dade County	1.13%	50 Oklahoma	0.84%	76 Oregon	0.65%
25 GA-Rest of State	0.32%	51 TX-Rest of State	0.17%	77 WA-Rest of State	0.56%
26 GA-Fulton/Dekalb	1.85%	52 TX-Dallas County	1.19%	78 WA-King County	1.55%

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