# Who' s Missing?

## An Analysis of Non-response and Undercoverage in the 1986 National Election Studies Post-election Survey

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Who's Missing?

The respondents in public opinion surveys differ from non-respondents in a fundamental way: respondents are willing to spend the time and energy to comply with an interview. Willingness to be interviewed may well interact with the independent variables one analyzes: not only will certain demographic groups display different levels of willingness to be interviewed, but also such important variables for political analysis as political interest or information may also interact with the likelihood of response (Heberlein and Baumgartner, 1978; Pearly and Fairley, 1985; O'Neil, 1979). Despite the best efforts at statistical sampling of individuals in the population, non-response means that the samples are not random. Analyses based on non-random samples may suffer dire inconsistency in estimates, whether the analyses are cross-tabular or regressions (Achen, 1986).

The National Election Studies suffers from comparatively high non-response rates, and the situation may be worsening. The response rate for the 1986 National Election Studies Post-election survey is 68%, a full four percent lower than the response rate for the 1984 Pre-/Post-election survey. Even the 72% response rate in the 1984 study is worrisome, but the drop of 4% in 1986 means that 125 fewer interviews were taken than if the response rate held to the 1984 level.

The drop in the 1986 response rate raises two major questions:

- Who's Missing? What are the characteristics of the non-respondents?
- What explains the drop in the National Election Studies response rate from 1984 to 1986?

The characteristics of the non-respondents in the NES samples provide clues about the possible effect of non-response on analysis. Do NES samples systematically exclude any demographic groups? Previous analysis of non-response suggest that the elderly, the

poor, families with low income, people with less education, and Blacks all tend to refuse participation in samples at a higher rate than average. O'Neil (1982) compared reluctant respondents with the remaining respondents and found that income, race and age interact with willingness to be a respondent. DeMaio (1980) identified age, income and region as factors in whether a respondent would refuse to participate in the survey. Other analysts point to potential attitudinal differences. Heberlein and Baumgartner (1978) compared response rates to 78 mail questionnairre studies and found that the likelihood of response varies with the altruism of the respondent. Pearl and Fairley (1985) found that the strength of the respondent's opinion strongly interacted with non-response bias. Stinchombe (1981) found demographic differences between farmers who refused farm surveys, but no attitudinal differences.

The analysis of this paper on the characteristics of the non-respondents takes two forms: First, a comparison of the demographic characteristics of the NES samples with the estimates for the same period from the Bureau of the Census Current Population Studies November supplements; Second, dichotomous regression analysis of the likelihood of response employing what information interviewers could gather from non-respondents, non-respondents' family members or neighbors.

Explanations of the causes for the decline in response rate potentially lead to remedies in future NES surveys. NES and Survey Research Center staff offer many explanations for the decline in response rate from 1984 to 1986 ranging from sampling differences to changes in the characteristics of respondents over time. In 1986, the NES sample included many new sampling units, requiring in some cases new field personnel and adjustment by interviewers to the quirks of interviewing in those new sampling units; did the new sampling units suffer from higher non-response than the other sampling units? Other surveys report declines in response rates over time (e.g., Steeh, 1981); have respondents become more difficult to interview? Participation in surveys about elections may derive from the same factors that induce participation in elections themselves; does

the fact that the 1986 survey took place in a Congressional election year imply that the response rate would be lower regardless of other factors? Do changes in the characteristics of the interviewing staff bode for changes in the proportion of interviews taken? Although few of these questions are conclusively answerable, this paper draws supporting or contradicting evidence from Census information about the sampling segments, differences in the characteristics of the respondents over time and the information about non-respondents supplied by non-respondents' family members and neighbors.

Characteristics of the non-respondents - comparisons across samples

Many previous studies of non-response bias proceed by comparing demographic distributions of the people the surveys obtain against population distributions or against surveys which employ different sampling techniques. Any such comparison confounds sampling and non-sampling causes for differences between a sample and the population.

Sampling errors account for some of differences between a sample and known population characteristics. For example, in the NES areal probability sample, individuals in group quarters (students in dormitories, soldiers in military barracks, prisoners) fall out of the sample frame. In telephone samples, individuals from households without telephones fall out of the sample frame. The absence of these people from the sample is a sampling error, generally referred to as non-coverage. Another known (and correctable) sampling error in the NES is introduced by the fact that the areal probability sample draws from a population of housing units, not individuals. One can correct for the variability for the probability of selection within a household, and convert a sample of housing units to a sample of individuals, but it is also a sampling error.

Non-response bias is a non-sampling error, but it is not the sole form of non-sampling error. Measurement error, deficiency in the capacity of the instrument to obtain the characteristics of the sample, accounts for additional differences between sample and population. Some measures have known biases in favor of the socially respectable

position: the NES and the Census alike suffer from the known propensity of people to claim they have voted, even if they have not. Because of measurement error, the NES undersamples non-voters. Other measures, even demographic ones, might well be suspected to be contaminated by measurement error: do individuals exaggerate or underrepresent their levels of income or education?

Simply comparing characteristics of the sample and the population does not distinguish between the multiple sampling and non-sampling errors. Nonetheless, such comparisons are useful in examining non-response error in that they provide an upper limit for the effect of non-response in excluding segments of the population. Since correction for the non-random selection of respondents in a survey itself confounds the multiple sources of error, examining differences between characteristics of the sample and the population provides the essential information for such corrections. This report proceeds with two forms of comparison of characteristics of the 1986 respondents: against respondents to Current Population Survey November Supplements taken at approximately the same time as the NES surveys and against the respondents to NES surveys for the previous few years.

In comparison with the CPS November Supplement estimates, the NES samples underrepresent some groups in explainable ways. The NES obtains fewer people who are hard to reach during the day and fewer people with low levels of education compared with the CPS estimates. The last five NES samples all display such disparities, and the 1986 NES Post-election sample appears to be no worse than the previous four samples. In other words, the drop in response rate belies no great shift in the demographic and attitudinal characteristics of the NES samples, but also that all the NES samples appear to suffer from

some important undercoverage[1] biases. Table 1 presents both CPS and weighted NES distributions over time.

Some people are harder to obtain interviews from simply because they aren't home during the day. Males who are currently working are more difficult to reach during the day than the rest of the population. Census estimates the proportion of males in the U.S. population to be 48%, while the NES obtains 44% males consistently (unweighted, the weighted proportion is 45% male).

The proportion of people working now in the NES exceeds the Census estimates by 9-10%. However, because Census and the National Election Studies employ different definitions of working status, comparisons between the CPS and NES estimates of the working status of the population are probably misleading. The CPS estimates for those "working now" falls 9-10% below the NES estimates for the same category; NES folds all students, housewives and retired people working over 20 hours per week into this category. The CPS estimate of the proportion of housewives in the voting age population is about 5-6% higher than the NES estimates. The CPS estimate of the proportion of students is about 10% higher. If all the NES understimates of students and housewives went into the "working now" category, NES would underestimate the fraction working now by 5%. The NES underrepresents students since the areal sample excludes people in dormitories. The differences between NES and CPS estimates of those working now, although striking in the table, arise more from differences in definitions than to probable undercoverage.

NES elicits interviews from 6% fewer people with less than a high school education than Census estimates for the voting age population. Conversely, NES obtains interviews from about 3% more people with college eudcations than in the Census estimates. To the

[1]Following the conventions of sampling literature, undercoverage describes the part of the sample frame which does not fall in to the sample and noncoverage describes the part of the population which does not fall in to the sample frame.

## Table 1
## CPS and NES Population Estimates

| Variable | Census estimates 1980 | Census estimates 1985 | Current Population Survey November Estimates 1978 | CPS 1980 | CPS 1982 | CPS 1984 | Weighted NES estimates 1978 | NES 1980 | NES 1982 | NES 1984 | NES 1986 | NES Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Race** | | | | | | | | | | | | |
| White | 85.9 | 85.1 | 87.3 | 86.1 | 86.1 | 86.1 | 89.0 | 87.4 | 89.3 | 86.8 | 83.8 | 87.3 |
| Black | 11.8 | 12.2 | 10.2 | 10.6 | 10.3 | 10.1 | 9.8 | 11.5 | 10.0 | 10.8 | 14.3 | 11.3 |
| Indian | | | | | | | 0.7 | 0.6 | 0.2 | 1.5 | 1.2 | 0.8 |
| Asian | | | | | | | 0.4 | 0.4 | 0.4 | 0.4 | 0.7 | 0.5 |
| **Sex** | | | | | | | | | | | | |
| Male | 48.6 | 48.7 | 48.1 | 48.1 | 48.2 | 48.1 | 45.9 | 44.9 | 46.4 | 45.3 | 45.8 | 45.7 |
| Female | 51.4 | 51.3 | 51.9 | 51.9 | 51.8 | 51.9 | 54.1 | 55.1 | 53.6 | 54.7 | 54.2 | 54.3 |
| **Age** | | | | | | | | | | | | |
| 17-35 years | | | | 28.0 | 27.0 | | 43.0 | 41.4 | 40.2 | 41.6 | 41.8 | 41.6 |
| 36-50 years | | | | | | | 25.4 | 23.5 | 23.2 | 25.7 | 28.3 | 25.2 |
| 51-64 years | | | | | | | 19.6 | 21.0 | 20.7 | 17.6 | 16.7 | 19.1 |
| 65+ years | | | | 16.0 | 16.0 | | 12.0 | 14.2 | 15.9 | 15.1 | 13.3 | 14.1 |
| **Living Alone?** | (Households) | | | | | | | | | | | |
| Yes | 22.7 | | | | | | 9.2 | 9.7 | 11.5 | 10.8 | 11.8 | 10.6 |
| No | 77.3 | | | | | | 90.8 | 90.3 | 88.5 | 89.2 | 88.2 | 89.4 |
| **Education** | (1982) | | | | | | | | | | | |
| 8 grades or less | 15.8 | | 13.8 | 12.8 | 11.9 | 10.9 | 11.2 | 11.2 | 10.2 | 10.1 | 8.1 | 10.2 |
| 9-11 grades | 13.3 | | 19.6 | 18.9 | 17.6 | 17.0 | 14.9 | 14.7 | 11.8 | 12.3 | 12.5 | 13.2 |
| H.S. diploma | 37.9 | | 35.1 | 35.5 | 36.3 | 36.4 | 38.5 | 37.9 | 35.7 | 37.0 | 36.6 | 37.1 |
| Some college | 15.3 | | 17.1 | 17.8 | 18.0 | 18.9 | 18.0 | 18.1 | 20.7 | 21.3 | 18.0 | 19.2 |
| Jr. or Comm. Coll. | | | | | | | 2.1 | 2.9 | 2.9 | 3.5 | 5.4 | 3.4 |
| BA degree | 17.7 | | 8.3 | 8.6 | 9.3 | 9.7 | 10.7 | 10.0 | 12.0 | 10.8 | 13.1 | 11.3 |
| Advanced degree | | | 6.0 | 6.5 | 6.9 | 7.1 | 4.7 | 5.3 | 6.7 | 5.0 | 6.3 | 5.6 |

| Variable | Census estimates 1980 | 1985 | Current Population Survey November Estimates 1978 | 1980 | 1982 | 1984 | Weighted NES estimates 1978 | 1980 | 1982 | 1984 | 1986 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Marital Status** | | | | | | | | | | | | |
| Married | 65.5 | | 61.2 | 60.5 | 59.8 | 59.4 | 70.5 | 66.6 | 66.0 | 63.8 | 64.4 | 66.3 |
| Never Married | 20.3 | | 12.3 | 12.8 | 13.3 | 13.5 | 14.8 | 15.9 | 15.9 | 16.9 | 15.8 | 15.9 |
| Divorced | 6.0 | | 26.5 | 26.7 | 26.9 | 27.0 | 5.4 | 6.7 | 6.2 | 7.6 | 6.1 | 6.4 |
| Separated | | | | | | | 2.2 | 2.0 | 3.0 | 2.3 | 2.8 | 2.5 |
| Widowed | 8.0 | | | | | | 6.4 | 7.5 | 7.4 | 7.3 | 6.8 | 7.1 |
| Partners | | | | | | | 0.7 | 1.4 | 1.5 | 2.2 | 4.1 | 2.0 |
| **Family Income** | (1982) | | | | | | | | | | | |
| <$5000 | 5.8 | | 2.0 | 9.8 | 9.2 | 8.9 | 5.6 | 7.6 | 7.9 | 7.5 | 5.8 | 6.9 |
| $5000-$9999 | 11.5 | | 19.6 | 17.1 | 14.9 | 13.0 | 13.1 | 12.9 | 12.2 | 12.4 | 10.2 | 12.2 |
| $10000-$14999 | 13.5 | | 21.5 | 18.7 | 15.7 | 14.2 | 19.2 | 14.5 | 13.4 | 13.1 | 11.9 | 14.4 |
| $15000-$19999 | 25.2 | | 16.3 | 15.0 | 13.3 | 12.3 | 18.6 | 12.3 | 10.2 | 9.5 | 8.5 | 11.8 | |
| $20000-$24999 | \| | | 12.9 | 14.8 | 11.9 | 11.0 | 16.3 | 16.1 | 14.1 | 11.8 | 10.4 | 13.7 |
| $25000-$29999 | 35.1 | | 14.9 | 20.6 | 9.4 | 9.4 | 9.0 | 10.6 | 8.8 | 9.6 | 8.8 | 9.4 |
| $30000-$34999 | \| | | | | 7.5 | 8.5 | 8.6 | 8.9 | 10.3 | 9 | 8.0 | 9.0 |
| $35000-$49999 | \| | | | | 11.3 | 13.2 | 6.6 | 10.0 | 13.2 | 11.4 | 18.7 | 12.0 |
| ≥$50000 | 8.9 | | 2.7 | 4.0 | 5.0 | 9.7 | 3.2 | 7.1 | 9.8 | 16.4 | 17.8 | 10.9 |
| **Hispanic Origin?** | | | | | | | | | | | | |
| Mex. Am./Chicano | 6.3 | | | | | | 1.6 | 1.9 | 1.2 | 5.5 | 3.8 | 2.8 |
| Puerto Rican | \| | | | | | | 1.1 | 0.7 | 0.7 | 0.7 | 0.6 | 0.8 |
| Other Hispanic | \| | | | | | | 0.6 | 1.0 | 1.6 | 1.1 | 1.1 | 1.1 |
| Not Hispanic | 93.6 | | | | | | 96.7 | 96.3 | 96.4 | 92.7 | 94.5 | 95.3 |
| **Census Region** | | | | | | | | | | | | |
| Northeast | 21.7 | | 21.3 | 20.4 | 20.5 | 21.8 | 22.3 | 20.8 | 20.4 | 18.5 | 17.3 | 19.9 |
| North Central | 25.9 | | 26.1 | 25.1 | 25.1 | 24.9 | 25.3 | 27.1 | 26.4 | 27.6 | 26.4 | 26.6 |
| South | 33.3 | | 29.1 | 30.6 | 29.9 | 29.5 | 35.6 | 35.8 | 35.8 | 33.6 | 36.6 | 35.5 |
| West | 19.1 | | 23.5 | 23.8 | 24.5 | 23.8 | 16.6 | 16.3 | 17.5 | 20.3 | 19.7 | 18.1 |

| Variable | Census estimates 1980 | 1985 | Current Population Survey November Estimates 1978 | 1980 | 1982 | 1984 | Weighted NES estimates 1978 | 1980 | 1982 | 1984 | 1986 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Population Size** | | | | | | | | | | | | |
| Central Cities | 29.5 | | | | | | 6.5 | 8.1 | 9.0 | 7.4 | 8.1 | 7.8 |
| SMSA | 38.6 | | | | | | 62.7 | 59.6 | 59.8 | 64.6 | 63.6 | 62.1 |
| rural | 31.9 | | | | | | 30.8 | 32.4 | 31.2 | 28.0 | 28.3 | 30.1 |
| **R's Working Status** | (1982) | | | | | | | | | | | |
| Working Now | 64.4 | | 51.4 | 51.4 | 50.2 | 52.3 | 61.4 | 61.6 | 58.1 | 62.1 | 64.7 | 61.6 |
| Laid off | | | | | | | 0.6 | 0.8 | 0.8 | 1.8 | 1.3 | 1.1 |
| Unemployed | | | 1.1 | 1.7 | 2.5 | 1.7 | 4.2 | 4.7 | 6.8 | 5.4 | 4.7 | 5.2 |
| Retired | | | 10.4 | 11.7 | 13.0 | 13.1 | 9.9 | 11.3 | 12.9 | 12.9 | 11.5 | 11.7 |
| Disabled | | | 1.6 | 1.4 | 1.3 | 1.3 | 1.7 | 2.9 | 2.4 | 2.5 | 2.5 | 2.4 |
| Housewife | | | 22.0 | 20.9 | 20.3 | 19.3 | 19.3 | 15.4 | 15.8 | 13.1 | 12.7 | 15.3 |
| Student | | | 13.5 | 12.9 | 12.8 | 12.4 | 2.9 | 3.4 | 3.3 | 2.1 | 2.6 | 2.9 |

| Variable | Census estimates 1980 | Census estimates 1985 | Current Population Survey November Estimates 1978 | 1980 | 1982 | 1984 | Weighted NES estimates 1978 | 1980 | 1982 | 1984 | 1986 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Party ID** | | | | | | | | | | | | |
| Strong Democrat | | | | | | | 14.5 | 17.2 | 19.9 | 16.9 | 17.1 | 17.1 |
| Weak Democrat | | | | | | | 24.3 | 22.8 | 23.6 | 20.8 | 22.1 | 22.7 |
| Ind. Democrat | | | | | | | 14.5 | 11.8 | 10.6 | 10.6 | 9.9 | 11.5 |
| Ind. Independent | | | | | | | 13.7 | 13.2 | 10.9 | 11.3 | 12.1 | 12.2 |
| Ind. Republican | | | | | | | 10.1 | 10.2 | 8.6 | 12.7 | 11.2 | 10.6 |
| Weak Republican | | | | | | | 12.8 | 14.0 | 14.4 | 15.2 | 14.4 | 14.2 |
| Strong Republican | | | | | | | 7.2 | 8.6 | 9.9 | 12.5 | 10.9 | 9.8 |
| **Lib/Con** | | | | | | | | | | | | |
| Extr liberal | | | | | | | 2.2 | 2.5 | 1.8 | 2.2 | 1.6 | 2.1 |
| Liberal | | | | | | | 10.4 | 8.1 | 8.7 | 9.9 | 7.8 | 9.0 |
| Slity liberal | | | | | | | 13.3 | 13.8 | 10.9 | 13.2 | 14.4 | 13.1 |
| Moderate | | | | | | | 36.9 | 29.5 | 35.4 | 33.9 | 36.2 | 34.4 |
| Slity conservative | | | | | | | 18.8 | 21.9 | 20.2 | 19.6 | 20.6 | 20.2 |
| Conservative | | | | | | | 15.4 | 20.5 | 19.5 | 18.9 | 17.4 | 18.3 |
| Extr conservative | | | | | | | 2.9 | 3.7 | 3.4 | 2.3 | 2.2 | 2.9 |
| **Turnout** | (of V.A.P.) | | | | | | | | | | | |
| Voted | 52.6 | | 49.9 | 64.7 | | 66.0 | 53.9 | 71.9 | 60.1 | 73.8 | 52.2 | 62.4 |
| Did Not Vote | 47.4 | | 50.1 | 35.3 | | 34.0 | 46.0 | 28.1 | 39.9 | 26.2 | 47.8 | 37.6 |
| **Reagan F-T** | | | | | | | | | | | | |
| 0°-10° | | | | | | | 5.4 | 6.8 | 11.4 | 7.8 | 7.1 | 7.7 |
| 11°-20° | | | | | | | 3.5 | 5.2 | 5.4 | 4.8 | 2.1 | 4.2 |
| 21°-30° | | | | | | | 5.7 | 6.0 | 6.4 | 5.4 | 5.0 | 5.7 |
| 31°-40° | | | | | | | 8.5 | 9.2 | 7.5 | 6.5 | 6.9 | 7.7 |
| 41°-50° | | | | | | | 22.8 | 15.8 | 11.3 | 10.2 | 10.9 | 14.2 |
| 51°-60° | | | | | | | 15.7 | 18.5 | 14.0 | 11.3 | 13.6 | 14.6 |
| 61°-70° | | | | | | | 16.2 | 16.3 | 17.2 | 19.3 | 19.0 | 17.6 |
| 71°-80° | | | | | | | 1.8 | 1.9 | 2.0 | 1.0 | 1.0 | 1.5 |
| 81°-90° | | | | | | | 12.4 | 14.6 | 17.4 | 21.7 | 20.8 | 17.4 |
| 91°-100° | | | | | | | 8.1 | 5.7 | 7.3 | 12.0 | 13.5 | 9.3 |

extent that interest in politics covaries with level of education, one might expect to draw fewer people with low levels of education into a survey about politics.

NES obtains interviews from slightly fewer families with low incomes than their fraction in the populaiotn. The CPS obtains 4% more respondents with family incomes in the two lowest categories (<$5000 and $5000-9999 per year) than the NES .

NES and CPS estimates of age diverge primarily in representation of the elderly. The proportion of the voting age population over 65 years old has been consistently 16% through the years 1978-1986. Unweighted NES estimates of the proportion of the elderly come very close to the 16% national proportion. However, by properly weighting for the probability of selection within households, the weighted estimates of the proportion of the elderly fall short by 3-4%. Higher refusal rates among the elderly repeats a widely reported finding in studies of non-response (e.g., DeMaio, 1980). Because the elderly live in families with fewer eligible adults, weighting reduces their relative proportion in the population.

The sole political variable in the Current Population Studies November Supplements is the estimate for turnout in the general election. CPS estimates of turnout exceed the actual turnout by at least 15% and NES estimates exceed actual turnout by at least 20%. Both surveys suffer from a self-reporting bias in favor of exaggerating turnout: the socially acceptable response is to claim that one voted, even if one didn't. The question of why NES estimates exceed even the CPS estimates may lie in two possible areas. One possibility is that the NES exaggerates the self-reporting bias in that the NES survey is explicitly about participation in politics, and perhaps inflates the social pressures to claim that one voted. A second possibility resides in the difference in non-response rates: the CPS non-response rate is a mere 4-5%, non-response for the NES runs from 28-34%. A reasonable hypothesis is that the NES draws disproportionately from the most interested and participative respondents.

Demographic comparisons between NES and CPS samples suggest that there are some undercoverage problems. The 4% drop in response rate from 1984 to 1986 did not significantly worsen the undercoverage. Demographic characterisitics of the 1986 NES sample look very much like the demographic characteristics of the 1978-1984 samples. Certainly, some of the demographic distributions vary from election to election, but not in ways consistent with the change in response rate. Political characteristics of the 1986 sample differ from the 1984 sample, but this is both welcome and not immediately attributable to changes in the non-response rate.

The demographic characteristics of the 1986 sample look like the 1984 sample. The proportion of males in the 1985 sample deviates from average by less than one-tenth of one perent (43.8% in 1984 vs. an average of 43.9%). The proportion of Blacks is higher in the 1986 sample than one would expect (14.9% vs. an average of 11.7%), but this difference is unlikely to derive from the change in response rate. Because non-response may covary with race (O'Neil, 1982), one would expect fewer Blacks in the 1986 survey. The proportion of respondents living alone rises by less than 2 percent from 1984 to 1986, consistent with the steady increase in people living alone in each successive sruvey from 1978 to 1984. The proportion of married respondents drops by two-tenths of one percent, a small change in comparison to the nearly 4% drop from 1978 to 1980.[1] Working status of the respondents, because of the wide fluctuations in the national economy from 1978 to 1986, is less stable than other demographic characteristics. The 1986 sample contains slightly fewer unemployed respondents than the 1984 sample (4.7% vs 5.4%), but the deviation is within a percent of the five year average and not immediately attributable to the change in response rate.

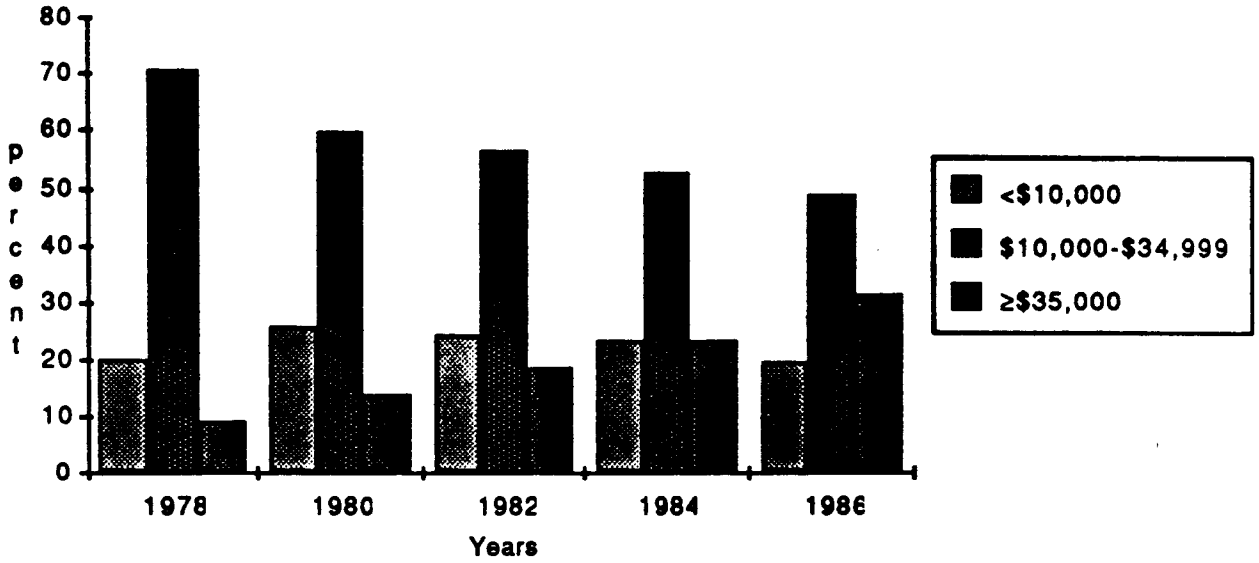
[1]The proportion of "common law" marriages ("Partners") rises dramatically from 1.9% in 1984 to 3.5% in 1986, but this is quite possibly a question effect. Respondents prior to the 1986 survey had to volunteer their status as "Partners," while respondents in 1986 were offered "Partners" as an alternative.

The distribution of age of respondents changes in ways coherent with the aging of the "Baby Boom" generation. Since 1978, the proportion of respondents between 17 and 30 years old drops from 30.5% in 1978 to 28.5% in 1986. The corresponding proportion of respondents between 31 and 50 years old rises steadily from 35.4% in 1978 to 38.8% in 1986. The change in response rate from 1984 to 1986 did not pan out as a drop in the youngest category: the proportion of respondents between 17 and 30 years old rises from 1984 to 1986, by seven-tenths of one percent.

Education and income of respondents does change noticeably across the five years of the NES studies represented in this report. The fraction of repsondents with 8 grades of education or less drops from 10.8% in 1984 to 8.8% in 1986. Conversely, the fraction of respondents with a college degree rises from 11.3% in 1984 to 13.2% in 1986. This change is consistent with the change in response rate, since one might expect that the less-educated respondents would drop out of the sample more than better educated respondents. Previous NES surveys fluctuated by less than one percent in the proportion of people with less than high school education, but the two percent drop here is not necessarily to be considered dramatic.

Family income distributions throughout the five NES surveys discussed here become more noticeably bimodal. A poorer mode of respondents maintains the same income from survey to survey, while a second mode of respondents rises steadily in income. If one splits the income distribution into three categories, it is evident from Chart 1 that the lowest category (<$10,000/year) remains roughly constant, the middle category ($10,000-$34,999) drops and the upper category (≥$35,000) rises. Family income of 1986 respondents is higher than for 1984 respondents, but only as an increase consistent with the changes over the previous four surveys.

Chart I
Family Income in the NES over time




One explanation for the drop in response rate from 1984 to 1986 raised by the Field Section of the Survey Research Center administering the NES is due to changes in the characteristics of rural and urban respondents. For various reasons, respondents in urban and rural areas are supposedly harder to persuade now than in previous years. This hypothesis is not supported by changes in the overall distribution of respondents from these areas, which remains highly stable over the five election years of this report. Respondents in Central Cities oscillate around 8% of the sample through the five studies, while respondents from rural areas drop slightly over time through the five studies. The consistency of the distribution of region of respondents belies the possibility of a sudden change in rural or urban respondents from 1984 to 1986.

While one would not like to see substantial changes in the demographic variable, the obverse may be true for the attitudinal measures. Surveying the changing political climate is the *raison d'etre* for the National Election Studies. As Table 1 details, such important measures as Party Identification, the Liberal/Conservative scale and Feeling

Thermometer scores for Reagan have fluctuated through the years in sensible ways. The sample has been warmer to Reagan, more Republican and more conservative in the Presidential election years. In no sense has the 1986 distribution of these measures jumped startlingly from 1984 to 1986.

Characteristics of non-respondents - logistic analysis

As explained above, simply because the NES samples underrepresent certain groups does not necessarily mean that non-response bias is the cause. Comparisons between NES samples and against the CPS samples concerns undercoverage of which non-response is only a single cause. Detecting non-response is a tricky matter: in order to compare non-respondents with respondents, one needs to collect the very same information that makes a respondent. Some approaches to this problem have compared the general respondents with the "difficult to reach" respondents — those people who after many refusals and callbacks eventually cooperated with the survey — as a proxy for the non-respondents. Such comparisons are useful, but rely on the assumption that people who eventually responded are representative of people who never responded.

This report pursues a different approach. When interviewers were unable to interview respondents, the interviewers were asked to collect demographic information from non-respondents' family members or neighbors. The non-interview information can not reasonably inspect the political attitudes of respondents, but some of the demographic information may be reasonably employed from the non-interview information. Specifically, race, sex, age, and family composition is fairly easy and reliable information to collect from non-respondents' neighbors or family members. We have also endeavored to collect income information, but this information is available for only a small fraction of the non-respondents. Even the set of information collected from neighbors in the non-interview file is biased: the most reclusive and recalcitrant of non-respondents would elude even this information. For this reason, this section does not

compare proportions. Instead, we use the non-interview information as a variance condition and attempt to predict whether the interview would elicit a response. Response becomes a dependent variable to be examined as a logistic function of demographic characteristics. That is, the log-odds of response are regressed against a linear function of demographic characteristics:

$$\log_e\left(\frac{P}{1-P}\right) = K = a_1 + b_1x_1 + \ldots + b_nx_n$$

One may then solve for P as a function of K, the sum of the estimated linear function:

(A) $$P = \left(\frac{e^K}{1+e^K}\right)$$

In the subsequent analysis, many of the independent variables are dummy variables. If none of the dummy variables are equal to 1, then K is the constant $a_1$. If only one of the dummy variables ($x_i$) is equal to 1 — in other words, holding all the other dummy variables constant — then K is $a_1+b_i$, and the normal response rate ($\hat{P}_0$) is:

$$\hat{P}_0 = \left(\frac{e^{a_1\cdot}}{1+e^{a_1\cdot}}\right)$$

Solving for P yields the expected response rate for the proportion of respondents who satisfy only that dummy variable, call it $\hat{P}_i$ If one then multiplies the expected difference in response rate ($\hat{P}_0 - \hat{P}_i$) times the proportion of the sample satisfying the dummy variable ($N_i$), one gets an estimate of the non-response bias ($NR_i$ ) for that variables as follows:

(B) $$NR_i = (\hat{P}_i - \hat{P}_0) \times N_i = \left(\left(\frac{e^{a_1+b_i}}{1+e^{a_1+b_i}}\right) - \left(\frac{e^{a_1}}{1+e^{a_1}}\right)\right) \times N_i$$

Unlike methods which confound multiple source of undercoverage or rely upon categories of respondents as proxies for non-respondents, this is a direct method of estimating the non-response bias of a particular category.

In this approach, one demographic variable emerges as a consistent predictor of non-response: whether the respondent was elderly (over 65 years of age). Other variables

surprisingly predicted higher response rates than average, in contradiction to the findings previously reported in the literature: if the individual lived alone, had children in the household or were of low or high income, the individual was more likely than average to respond.

Before proceeding with the report of the non-response bias estimates, the question of how one treats missing data for non-respondents is critical. If one adopts a "strict information" approach, one should require evidence that the non-respondent satisfies a dummy variable or not, otherwise that non-respondent should be excluded from the analysis. The "strict information" approach, in effect, says that evidence that a person fits a category is of equal weight to evidence that a person does not fit a category. The "strict information" approach discards cases. However, if one wishes to gauge whether an individual is likely to respond, a "loose information" approach might be warranted: if a person is not known to fit a category, then that person should be coded 0 along with those people who are known not to fit the category. The "loose information" approach argues that evidence that a person fits a given category is of greater predictive value than whether a person does not fit the category. Both approaches are employed in the following analyses.

Five variations of the logit models of non-response as a function of age and income are reported in Table 2. Note that all five of the models achieve roughly the same level of accuracy. Because of the limited information that could be collected about non-respondents and the degree to which this information covaries, in the "Strict Information" models only a few variables could be included at any time. In addition, whether an individual's household included children and whether the individual lived alone are, obviously, two ways of coding the same variable; in the "Loose Information" models, only one of these two could be included.

Table 2
Logit Models of Non-response based on Demographics

| | Info level | Constant | Elderly | Young | Alone | Any Kids | Low Inc | High Inc | R2 |
|---|---|---|---|---|---|---|---|---|---|
| I. | strict | 1.1 | -.59 | .08 | | | | | .63 |
| | | (.04) | (.06) | (.06) | | | | | |
| II. | | 1.23 | -.56 | | | | 0 | | .63 |
| | | (.05) | (.04) | | | | (0) | | |
| III. | | .77 | -.06 | | | | | 0 | .63 |
| | | (.01) | (.003) | | | | | (0) | |
| IV. | loose | .47 | - 1.05 | -1.14 | | .44 | 1.37 | 1.54 | .55 |
| | | (.07) | (.10) | (.08) | | (.08) | (.12) | (.17) | |
| V. | | .57 | -1.20 | -1.14 | .66 | | 1.19 | 1.62 | .55 |
| | | (.01) | (.02) | (.02) | (.02 | | (.12) | (.17) | |

Before proceeding with the calculations of the non-response bias for the given categories, it is well worth pointing out the probably spurious effect of the income variables on response in the "Loose Information" models. In most of the cases where the NES was able to obtain income information, the NES was also able to obtain a response. Consequently, the strong positive coefficients on the income variables may merely repeat the information in the dependent variable. Note that the coefficients on the income categories in the "Strict Information" model are zero, suggesting that individual's income did not affect the likelihood of response.

Only one of the demographic measures in the five models on age and income reported above consistently depressed the response rate (i.e., had a negative coefficient). In the strict information model, the dummy variable for age less than 30 is positive, while in the loose information model, the same coefficient is negative. All the other coefficients are positive or zero, indicating that the measure did not depress response rate. Applying the equation derived in (B) above, the non-response bias for the elderly ranged as follows:

Table 3.
Non-response bias for the elderly

| Model | $NR_{elderly}$ |
|---|---|
| I. | -0.02 |
| II. | -0.02 |
| III. | -0.002 |
| IV. | -0.04 |
| V. | -0.05 |

As discussed above, when one compares the proportion of the elderly estimated by the NES to the estimates by the Census CPS, the NES weighted estimates fall short by 3-4%. Except for Models III and V, the estimated non-response rate for the elderly is well within that range of undercoverage. The strong suggestion of the estimated non-response bias is that nearly all of this undercoverage is a non-response problem.

Similar analysis of race and sex variables points to serious non-response bias among Blacks and males. A "strict information" model of response as a logistic function of two dummy variables (Black =1, Else=0; Male=1, Else=0) reports strong negative coefficients for Blacks and males:

log-odds(Response) = 1.24 - .40 Black? - .32 Male?
(.05) (.04) (.05)

Applying the formula in (B) yields Non-response biases for the different groups as follows: Blacks, 1%, Black Males 1.5%, Males 2.9%. However, comparing the actual weighted proportions of the NES sample against the CPS estimates shows no undercoverage of Blacks in the NES samples (Table 1, above). NES does obtain weighted proportions of males consistently about 3% below national proportions.

Because the coefficients on the other demographic measures are unstable or likely to be spurious, one can not say based on this evidence that the NES undercoverage of low-income people is a non-response problem. Because it was not possible to collect information about the level of non-respondents' education or political activities, it is also

not possible to determine the extent to which non-response accounts for NES undercoverage of these areas.

The fact that the NES suffers from non-response bias in coverage of the elderly, Black and male sub-populations is serious in certain contexts. The NES has displayed particular interest in developing measures of the political concerns and activities of the elderly in such recent Pilot Studies as 1985 . If one wishes to attend to the attitudes of the elderly as a special subset of the population, then one must account for the higher non-response in this group. Possible non-response bias among Blacks in the NES is equally troublesome in light of developing measures of racism in the NES.

What explains the drop in the 1986 response rate?

Several different general hypotheses might be drawn to explain the 4% drop in response rate from 1984 to 1986. Each of the general hypotheses leads to different approaches as to how one would reverse the decline in response rate in a future survey. Was the four percent drop due to changes in the respondents over time? Was the lower response rate the result of the assignment of interviewers? Did administration of the survey in the field account for a lower rate? Did the inclusion of several additional primary clusters in the sample reduce the response rate? Were clusters in particular areas of the country responsible for a lower response?

Few of these questions can be answered conclusively. The non-response file contains considerable information about a single time point, but the drop in response rate is a phenomenon over time. Because we lack information about the non-respondents and interviewers in 1984, we can not compare them to interviewers and non-respondents in 1986. We can observe the changes in the respondents over the years; we can examine the response rate in the new clusters compared with the response rate in the old clusters; we can evaluate the effect of the experience of the 1986 interviewers on response rate; we can examine the characteristics of the low-response clusters. This information provides at best

an impressionistic approach to the causes for the drop in response rate. The opportunity to compare non-respondents across surveys would await a similar collection of non-respondent information in 1988.

*Was the four percent drop due to changes in the respondents over time?* This hypothesis, raised by the field section of the Survey Research Center, is that respondents have become more difficult to interview. If this is the case, then there is little that could be done in the future to guard against a similar drop in response rate in future surveys. In the sense that difficulty of respondents should appear in the data, the first section of this report demonstrated no demographic or attitudinal shifts from 1984 to 1986. In another sense, because one lacks equivalent demographic information about the non-respondents in 1984, one can't tell whether the proportion of undercoverage due to non-response has been shifting over time. It is possible that the refusal rate among the elderly, for example, has risen at the same time that any undercoverage of the elderly due to sampling errors might have fallen. It is also possible that the obstinacy of respondents cuts across the demographic groups examined in this report. However, the consistency of both political and demographic data across five election years suggests that the obstinacy of the respondents did not dramatically increase from 1984 to 1986.

*Was the lower response rate the result of the assignment of interviewers?* Members of the NES staff raised this possibility. Is there a curvilinear relationship between the experience of the interviewers and the likelihood of response? One possibility is that a lower response rate for the more experienced interviewers might be due to assignment of the more "difficult" respondents to the more experienced interviewers. If the lower response rate is due to assignment of skilled interviewers, then both hiring policy and the allocation of interviewers might be improved to improve the response rate.

Interviewer experience yields an equivocal effect upon likelihood of response. In one sense, the response rate was curvilinear by the experience of the interviewer. Interviewers hired before 1984 obtained a 67.5% response rate, interviewers hired in 1984

obtained a 75% response rate, and interviewers hired since 1984 obtained a 64.6% response rate. In other words, the better interviewers (by the percent of interviews taken) were those hired in 1984. If one looks at the actual number of years of experience, the likelihood of response flattens out for interviewers hired before 1984. A logit model of response as a function of the years of experience for the interviewer yields an weak relationship between interviewer experience (years worked, IwrExper) and likelihood of response:

$$\text{log-odds(Response?)} = \underset{(.22)}{1.7} \; \underset{(.05)}{-.09}\,\#\text{Transfers} + \underset{(.01)}{.02}\,\#\text{Calls} - \underset{(.03)}{.06}\,\text{IwrAge} + \underset{(.04)}{.02}\,\text{IwrExper}$$

As the number of transfers and number of calls per case increased, the chances for a response dropped noticeably. From the evidence here, it is unclear whether the interviewers hired in 1984 were uniquely skilled or that after a few years of interviewing, the success of the interviewer diminishes.

One hypothesis raised by the NES staff is that the more experienced interviewers were assigned to the more difficult cases and were thus less likely to get successful interviews. The concept of a "difficult" case is tricky to operationalize. The ways in which the analysis reported here attempted to operationalize "difficult" cases did not show that more experienced interviewers had a larger share: the number of transferred interviews, total number of days elapsed per interview, and total number of calls were all approximately equal across the levels of interviewer experience. The interviewers hired in 1984 had generally less difficulty obtaining interviews than the other interviewers.

Table 4
"Difficult Interview" Measures per Interview by Interviewer Experience

| | After '84 | In '84 | Before '84 |
|---|---|---|---|
| #Transfers | 1.43 | 1.30 | 1.7 |
| Elapsed Days | 20.23 | 15.6 | 20.4 |
| Total # calls | 4.6 | 3.8 | 4.7 |

*Did administration of the survey in the field account for a lower rate?* As raised by Brehm (1985), there appears to be a limited period of time in which one may keep a

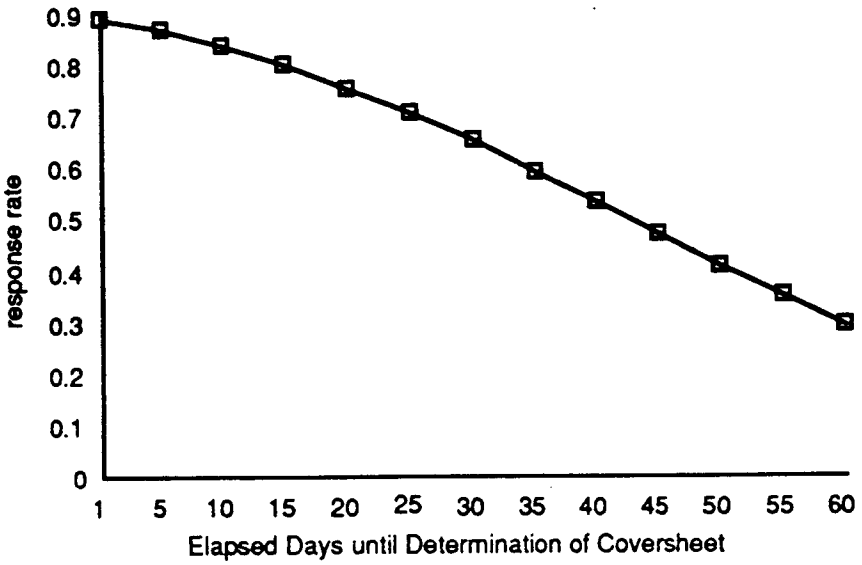
coversheet "alive" and expect to obtain a successful interview. By this argument, there are diminishing returns to assigning interviewers to interview reluctant respondents for each successive day. By keeping the interviewers assigned to the original coversheets, one depresses the response rate by not providing the time for interviewers to go to more productive and recent contacts. If this is the case, then one could achieve a higher response rate by recognizing unlikely respondents earlier and re-assigning the interviewers to other coversheets.

For each day that a pending coversheet was kept from assessment, the likelihood that the coversheet would eventually become an interview decreased. One can estimate the dichotomous variable for response against a logistic function of the number of days the coversheet took for the determination:

$$\text{log-odds(Response?)} = \underset{(.12)}{2.13} - \underset{(.002)}{.05}\ \text{DaysAlive}$$

Applying the formula derived in (A) above, this yields a likelihood of response curve depicted in Chart 2:

**Chart 2**
**Estimated Response Per Day Alive**



After 30 days of keeping a coversheet available, the predicted response rate drops below 70%. By the 50th day, the predicted response rate drops to 40%. The mean number of days to obtain an interview was 12.4 days (std.dev = 16), while the mean number of days for non-responses was 34 days (std. dev = 23). By this analysis, one might improve response rates by assessing non-responses sooner. The response rate is likely to fall below 70% after the 30th day; automatically assessing non-response status to coversheets in the field after that point is not likely to dampen the response rate much more.[1]

*Did the inclusion of several additional primary clusters in the sample reduce the response rate?* The 1986 sample included 66% of the primary clusters, compared with 50% of the primary clusters included in the 1984 sample. Did the new clusters suffer from a worse response rate? To the extent that response rate depends on the familiarity that interviewers have with the cluster area or that new clusters require new personnel, it is possible that the new clusters reduced the likelihood of response. If this is the case, then attention to the training and oddities of the new clusters should improve the response rate in the next study.

**The inclusion of new clusters depressed the overall response rate by about 1%.** The response rate in the "old" clusters was 68.7%, from which a total of 2596 cases were accumulated. The response rate in the "new" clusters was 65.6%, from which a total of 1237 cases were interviews. The difference between the new and old clusters was a 3.1% drop in response rate. The weighted average of this response rate accounts for 3.1%x1237/(2596+1237) or 1%. Even the response rate for the old clusters alone dropped 3% since 1984, so the inclusion of new clusters is certainly not the sole culprit.

Why would the response rate be lower in the new clusters? One hypothesis is that the new clusters may require new personnel. This hypothesis is not supported by the data,

[1]Although just summarized here, a similar analysis of the likelihood of response given the day the coversheet was first issued suggests that the day a coversheet was issued does not affect the likelihood of getting a successful response.

since the response rate for all levels of interviewer experience dropped in the new clusters. As Table 5 shows, the greatest increase in response rate in the new clusters occured among the interviewers hired in 1984 — the group of interviewers with the best hiring rate.

Table 5
Response Rate for New And Old Clusters by Interviewer Hiring Date

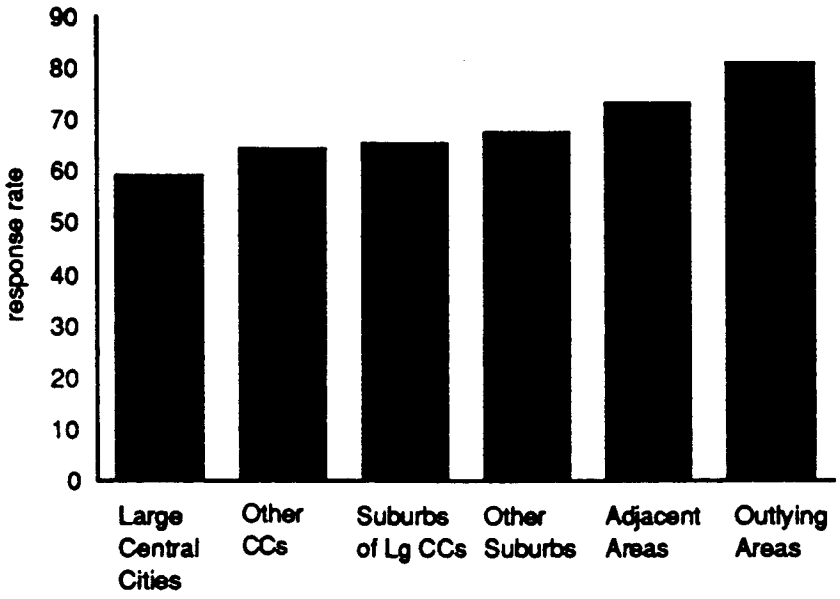
| | After '84 | In '84 | Before '84 |
|---|---|---|---|
| Old Clusters | 65.3 | 75.2 | 67.4 |
| New Clusters | 63.6 | 72.9 | 67.8 |

A second reason why the response rate in the new clusters would be lower than the response rate for the old clusters is sampling variation.

*Were clusters in particular areas of the country responsible for a lower response?* Maria Sanchez of the Field Section of the Survey Research Center raised in a memo to the NES staff (1987) the possibility that people in rural areas, primarily farmers, were so dejected at the response of government to the condition of the farm economy that response rates in rural areas was lower than expected. If this is the case, then sympathetic attention by the interviewers (by way of prompting or special refusal conversion letters) might improve the sense of efficacy the study affords rural people.

**As the population size of the area decreases, the likelihood of a response increases.** Chart 3 displays the response rate by the 1980 Census Belt Codes. Unequivocally, the chart illustrates that response rate rises as the population size falls.

Chart 3
Response rate by 1980 Census Belt Codes




This is in some ways counter to the theory proposed by Sanchez and reported above: the rural areas have the best response rates. There is no comparison in this report between the rural response rates of previous studies, however, if the response rate for people in rural areas has dropped, they are still more willing to provide interviews than respondents in more urban areas. Furthermore, the proportion of interviews with people in rural areas has remained roughly constant, as reported in the first section of this paper. If one looks at the best and worst primary sampling units by response rate, both lists are well-mixed by rural or urban character. The worst clusters included Phoenix, Miami, McAllen (TX), Manchester (NH), Riverside (CA), New York and Atlantic City (NJ). The best clusters included Des Moines, Montgomery County (VA), Kansas City, Minneapolis and Saginaw County (MI).

The related problems of undercoverage and non-response bias are observable within specific demographic categories. Undercoverage is apparent among low-income people, people with little education, Blacks and the elderly. Non-response bias accounts for the bulk of the undercoverage among the elderly, and is thus of direct concern to the

statistical quality of analysis based by age cohorts. How the undercoverage affects the quality of attitudes remains to be seen.

Why the response rate dropped from 1984 to 1986 also remains partially a mystery. Some of the problem is due to poor luck in the use of new clusters which had lower than average response rates. Some of the problem has to do with the skills of the interviewers, and the 1984 cohort of NES interviewers performed marginally better than other cohorts. Further analysis of the causes of change in non-response rate awaits future collections of information about non-respondents.

References

Achen, C. The Statistical Analysis of Quasi-experiments. (Berkeley, CA: University of California Press, 1986). 172 pp.

Brehm, J. "Analysis of Result Code Disposition by Time in Field," NES Working Paper No. #.

DeMaio, TJ. "Refusals: Who, Where and Why" Public Opinion Quarterly1980, 222-233.

Heberlein, TA and Baumgartner, R. "Factors affecting response rates to mailed questionnaires: A quantitative analysis of the published literature," American Sociological Review 1978, vol 43, 447-462

O'Neil, MJ. "Estimating Non-response bias due to refusals in telephone surveys," Public Opinion Quarterly. 1949, 43(2):218-232.

Pearl, DK and Fairley, D. "Testing for the potential for nonresponse bias in sample surveys," POQ 1985, 553-559.

Steeh, CG. "Trends in non-response rates 1952-1979", Public Opinion Quarterly. 1981:46-57.

Stinchcome, AL, et. al. "Nonresponse Bias for Attitude Questions," Public Opinion Quarterly1981 359-375