Outline

- Overview of response rate issue
- Overview of non-response bias
- Review of available methods for identifying non-response bias
- Summary of known non-response correlates
Main Problem Confronting Us

- How accurate is survey data in an environment in which response rates continue to fall (in all developed nations)?
Telephone Survey Response Rate
(% of households sampled that yielded an interview)
1997-2012

Source: Pew Research Center for the People & the Press
Response rates are the most widely compared statistic for judging survey quality.

- Atrostic et al. (2001)
- Biemer and Lyberg (2003)
What are the reporting practices regarding survey response rates?
Standard Definitions
Final Dispositions of Case Codes and Outcome Rates for Surveys

Revised 2011

RDD Telephone Surveys
In-Person Household Surveys
Mail Surveys of Specifically Named Persons
Internet Surveys of Specifically Named Persons
AAPOR Standards

- have been adopted/endorsed by many, including:
  - At least two top survey research journals:
    - *Public Opinion Quarterly*
    - *International Journal of Public Opinion Research*
  - publications such as:
    - *Encyclopedia of Survey Research Methods*
    - *Handbook of Survey Research*
  - organizations such as:
    - International Social Survey Programme
    - Organisation for Economic Co-operation and Development (OECD)
Are standard response rates good enough?
Are standard response rates good enough?

CERTAINLY NOT
What is non-response bias?

- the difference in a measureable characteristic between persons who respond to a survey and the population to which we are trying to generalize
Formula for non-response bias
(Levy & Lemeshow, 1999, p. 394):

$$B(x) = \bar{X}_1 - \bar{X} = \left( \frac{N_2}{N} \right) (\bar{X}_1 - \bar{X}_2)$$

\(N\) = total sample
\(N_1\) = total respondents
\(N_2\) = total non-respondents
\(\bar{x}_1\) = mean value among respondents
\(\bar{x}_2\) = mean value among non-respondents
\(\bar{x}\) = mean value for total sample
Assume 50% RR and current diabetes prevalence estimate of 20%

<table>
<thead>
<tr>
<th>Scenario</th>
<th>$\bar{X}_1$</th>
<th>$\bar{X}_2$</th>
<th>$\bar{X}$</th>
<th>$B(\bar{x})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>0</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>20%</td>
<td>100%</td>
<td>60%</td>
<td>40</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>20%</td>
<td>0%</td>
<td>10%</td>
<td>10</td>
</tr>
<tr>
<td>Scenario 4</td>
<td>20%</td>
<td>35%</td>
<td>27.5%</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Non-response bias as function of response rate ($t_R$)

Empirical research in general finds no response rate effect on bias:

- Groves & Peytcheva (2008)
- Keeter et al. (2000)
- Keeter et al. (2006)
- Curtin, Presser and Singer (2000)
Example of no relationship between non-response and measurement error

Figure 2. Percentage Absolute Relative Nonresponse Bias of 959 Respondent Means by Nonresponse Rate of the 59 Surveys in Which They Were Estimated.

Some variables affected by non-response

- Compared to respondents, non-respondents:
  - Have poorer physical health (Cohen & Duffy, 2002)
  - Have poorer mental health (Clark et al., 1983)
  - Have worse medication adherence (Gadkari et al. 2011)
  - Have higher mortality (Barchielli & Balzi, 2002)
  - Have higher negative evaluations of health care (Perneger et al., 2005)
  - Are more likely to smoke (Cunardi et al, 2005)
  - Are more likely to drink heavily (Wild et al., 2001) or not at all (Viviënne et al., 2002)
  - are more likely to attend church (Dunne et al., 1997)
Some variables affected by non-response

- Compared to responding employees, non-responding employees:
  - Have greater intentions to quit job
  - Have less organizational commitment
  - Have less satisfaction toward supervisors and their own jobs
  - Have more negative beliefs about how their organization handles employee data (Cohen & Duffy, 2002)
Concern that increased field efforts to minimize non-response error may lead to increased measurement error

- Motivation could be cause of both willingness to participate in a survey and willingness to perform cognitive processing necessary to produce optimal answers
- Hence, additional field efforts may do more harm than good by adding poorer quality data
Some Evidence

● Cannell & Fowler:
  ● Number of hospital stays and length of stay less accurately reported by those who responded to later follow-ups

● Olson (2006):
  ● Found that increased field work decreased nonresponse error more than it increased measurement error

● Kreuter, Müller & Trappmann (2010):
  ● Findings similar to Olson (2006)
Non-response Bias Assessment
Methodologies I

Approaches that use internal criteria

1. Comparing early vs. late Respondents
2. Follow-up surveys with initial non-Respondents
3. Comparing Respondent characteristics with estimated characteristics of non-respondents
4. Panel attrition in longitudinal studies
5. Use of vignette questions
Non-response Bias Assessment
Methodologies II

Approaches that use external criteria

6. Comparisons of surveys with varying response rates
7. Comparisons of using other external data sources
8. Comparisons of information from sample frame for respondents vs. non-respondents
9. Comparisons via record matching
Comparing Early vs. Late Respondents (or initial refusers)

- a.k.a. “level of effort” analysis (Olson, 2006)
- examining late respondents (or initial refusals) under the assumption that they are most similar to non-respondents
  - The “continuum of resistance” (Filion, 1976)
- Very common and inexpensive approach (Cottler et al., 1987; Crawford, 1987; Etter & Perneger, 1997; Fitzgerald & Fuller, 1982; Miller & Wedeking, 2004; Siemiatycki & Campbell, 1984; Sharp & Feldt, 1959; Stinchcombe et al., 1981; Voigt et al., 2003; Wilson, 1981)
- One variation is to include “days to respond” in regression models to determine if it is associated with key survey questions (Lindner, Murphy & Briers, 2001)
Follow-up Surveys with Initial Non-respondents

- Designed to collect data from persons classified as non-respondents to an original survey
- Also a common strategy (Casper, 1992; Crawford, 1986; 1987; Gmel, 2000; Groves et al., 2005; Hill & Roberts, 1997; Lahaut et al., 2002; Lemmens et al., 1988; Shahar et al., 1996; Turner, 1999)
- Often use different modes and more intensive methods
- Burden minimized by asking fewer questions
- Benefits maximized by increasing incentives
Comparing Respondent Characteristics with Estimated Characteristics of Non-respondents

- Impute the characteristics of non-respondents and compare them with respondents
- Information for imputation can come from:
  - Screening interviews
  - Direct household observations
  - Informant reports
  - Geographic and other databases
Panel Attrition in Longitudinal Surveys

- Examine common baseline information for respondents and non-respondents to follow-up interview requests

- **Very common approach** (Barchielli & Balzi, 2002; Bucholz et al., 1996; Caetano et al., 2003; Eaton et al., 1992; Hill & Willis, 2001; Gray et al., 1996; Kalton et al., 1990; Wild et al., 2001; Wilson et al., 2001)

- **Limitations:**
  - bias may still exist with regard to initial sample selection
  - Processes leading to attrition may be different from those leading to initial non-participation
Use of Vignette Questions

- Example:
  - “Would you take part in a telephone survey about domestic violence by a university if you were randomly selected?” (McNutt & Lee, 1999)

- Evaluates potential effects of non-response by comparing the answers of survey respondents who do and do not indicate a willingness to participate in hypothetical future interviews about specific topics

- Not as many examples (Kleseges et al., 1999; McNutt & Lee, 1999; Rogelberg et al., 2000; Waltermauer et al., 2003)
Comparisons of Surveys with Varying Response Rates

- One form of “benchmarking”
- Approaches:
  - Compare results of surveys using rigorous vs. “standard” survey procedures (Keeter et al., 2000; 2006)
  - Compare survey results with high response rate, official government surveys (Krosnick, Holbrook & Pfent, 2003)
  - Findings of these studies suggest effects of non-response on empirical results were relatively modest in size
Comparisons of Respondents and Non-respondents Using Other External Data Sources

- Survey sample compared to other data sources believed to represent population of interest

- Limitations:
  - Can be many unknown differences in how statistics were compiled across various sources
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>AMA(^{a})</th>
<th>Survey sample(^{b})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>30.2%(^{c})</td>
<td>24.4%</td>
</tr>
<tr>
<td>Metropolitan(^{e})</td>
<td>74.6%(^{c})</td>
<td>70.1%</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>20.9%(^{d})</td>
<td>23.5%</td>
</tr>
<tr>
<td>Midwest</td>
<td>22.4%(^{d})</td>
<td>24.9%</td>
</tr>
<tr>
<td>South</td>
<td>33.8%(^{d})</td>
<td>31.9%</td>
</tr>
<tr>
<td>West</td>
<td>22.9%(^{d})</td>
<td>19.7%</td>
</tr>
<tr>
<td>Medical school graduation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within last 10 years</td>
<td>27.4%(^{d})</td>
<td>13.0%</td>
</tr>
<tr>
<td>11–20 years ago</td>
<td>29.6%(^{d})</td>
<td>33.6%</td>
</tr>
<tr>
<td>21–30 years ago</td>
<td>21.1%(^{d})</td>
<td>26.0%</td>
</tr>
<tr>
<td>More than 30 years ago</td>
<td>21.9%(^{d})</td>
<td>27.4%</td>
</tr>
</tbody>
</table>

\(^{a}\)Pasko, T., Seidman, B., and Birkhead, S. *Physician Characteristics and Distribution in the US*. American Medical Association; 2000 (34).

\(^{b}\)Sample weighted for physician specialty. Sample contains nonfederal physicians only.

\(^{c}\)Nonfederal Physicians 1998.

\(^{d}\)Total Physicians (Federal and Nonfederal) 1998.

\(^{e}\)Contains AMA’s “Metropolitan” category and survey “Urban” and “Suburban” categories.
Comparisons of Information from Sample Frame for Respondents vs. Non-respondents

- Sample frames are often available that contain rich information regarding all members of the population.
- Excellent opportunity to both validate self-reports and make direct comparisons between respondents and non-respondents.
- Many examples (Clusen et al., 2002; Goldberg et al., 2001; Krueter et al., 2010; Olsen, 2006; Oropsea & Landale, 2002; Russell, et al., 2004; Solberg et al., 2002; van den Akker et al., 1998)
- Typically the best approach to investigating nonresponse bias.
Comparisons of Respondents and Non-respondents via Record Matching

- Employs auxiliary data from other sources that offer complete coverage of the population being surveyed to compare responders with non-responders.

- **Classic example:** Groves & Couper (1998)
  - Obtained matched decennial Census for respondents and non-respondents to several other government surveys.
Summary of known correlates of likelihood of respondent contact

- **Social environment**
  - Urbanicity/population density (-)
  - Crime rate (-)
  - Multi-unit housing structures (-)
  - Physical barriers (-)
  - Employment rate (+)

- **Survey design**
  - Number of calls to household (-)
  - Weekday evening calls (+)
  - Pre-tailoring (+)

- **Interviewer**
  - Flexible interviewer schedule (+)
  - Interviewer self-confidence/positive attitude (+)

- **Household(er)**
  - More than one adult in household (+)
  - Young children in household (+)
  - Elderly in household (+)
Summary of known correlates of likelihood of respondent cooperation

- **Social environment**
  - Employment rate (-)
  - Population density (-)
  - Crime rate (-)
  - Age of HH members (-)
  - No children in HH (-)
  - One resident in HH (-)
  - Multi-unit housing structures (-)
  - Presidential approval ratings (+)
  - Percentage of population below age 20 (+)

- **Household(er)**
  - Socio-economic status (-)

- **Survey Design**
  - Introduction tailoring (+)
  - Scheduling appointments for later HH visits (+)

- **Interviewer**
  - Frequently change jobs (-)
  - Experience with same organization (+)
  - Self-confidence (+)
  - Self-monitoring (+)
  - Friendliness (+)
  - Positive attitude (+)
  - Perception job is easy (+)
  - Highly organized (+)
Figure 2.1  Nonresponse Model Proposed by Groves and Couper (1998)

OUT OF RESEARCHER CONTROL

Social Environment
- Economic conditions
- Survey-taking climate
- Neighborhood characteristics

Householder(ers)
- Household structure
- Sociodemographic characteristics
- Psychological predisposition

UNDER RESEARCHER CONTROL

Survey Design
- Topic
- Mode of administration
- Respondent selection

Interviewer
- Sociodemographic characteristics
- Experience
- Expectations

Householder-Interviewer interaction

Decision to cooperate or refuse
NONRESPONSE
IN SOCIAL SCIENCE SURVEYS
A RESEARCH AGENDA

Roger Tourangeau and Thomas J. Plewe, Editors
Panel on a Research Agenda for the Future of Social Science Data Collection
Committee on National Statistics
Division of Behavioral and Social Sciences and Education

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Thank You

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