Introduction to the Research and Development Survey and Calibration Approaches for Panel Surveys

Katherine Irimata

November 3, 2021
National Center for Health Statistics

- The National Center for Health Statistics (NCHS) is the principal health statistics agency in the United States
- NCHS monitors the nation’s health by collecting, analyzing, and disseminating health data to:
  - Document the health status of the U.S. population and selected subgroups
  - Identify disparities in health status and use of health care
  - Inform and evaluate health policies
  - Monitor trends in health indicators
NCHS Data Systems

- NCHS collects health data using various data systems:
New Data Sources: Panel Surveys

- Panels contain a group of potential survey respondents maintained by private companies (e.g., Gallup, NORC, IPSOS)
- Panelists can be recruited passively using a non-probability sample (opt-in) or actively based on statistical sampling (recruited)
- Many panel surveys utilize web and phone modes
- Relatively faster data collection and lower cost compared to in-person household surveys
- Limitations include lower sample sizes, higher non-response bias, and coverage bias
Research and Development Survey

- NCHS started the Research and Development Survey (RANDS), an ongoing, periodic set of probability-sampled commercial panel surveys, in 2015
- Established in response to the growing interest in alternative survey modes and the maturation of relatively inexpensive, commercial survey panels
- Designed for methodological purposes
  - Measurement error: supplement survey and questionnaire evaluation efforts
  - Estimation: explore ways to integrate data from commercial survey panels with high-quality data collections, including calibration
Outline

- RANDS
  - Questionnaire
  - Survey Design
  - Timeline
  - Completed Rounds
- Calibration
  - Background
  - Calibration in RANDS data
- Summary
RANDS
Questionnaire

- Questions focus on a range of health-related topics including chronic conditions, access to healthcare and utilization, and opioid use
- Rounds may have specific topic focus (e.g., RANDS 4 – disability, etc.)
- Most questions in completed rounds have been from the National Health Interview Survey (NHIS) questionnaire
- Embedded probe questions are also used to examine respondent question interpretation
Survey Design

- Target population includes general adult population of the United States (18 years and older)
- Sample drawn from probability-based sample using stratified sample design
- Sampling strata formed using combinations of demographic variables (such as age group, race/ethnicity, sex, etc.)
- Within strata, sampling performed using simple random sampling
- Panel weights account for selection into the commercial panel and for selection into RANDS, with adjustments for non-response and under coverage of groups on the sampling frame
Rounds

- RANDS started in 2015 and are numbered according to the order of collection
- Four rounds of regular collection have been conducted (RANDS 1, RANDS 2, RANDS 3, and RANDS 4)
- In response to the COVID-19 pandemic, a special series of RANDS was used to report on the impact of the pandemic termed RANDS during COVID-19
- Three rounds of RANDS during COVID-19 have been conducted (RANDS during COVID-19 Rounds 1, 2, and 3)
Timeline


RANDS 1  RANDS 2  RANDS 3

RANDS during COVID-19 Round 1
RANDS during COVID-19 Round 2
RANDS during COVID-19 Round 3

RANDS 4
RANDS during COVID-19 Round 4
# Overview of completed rounds of RANDS

<table>
<thead>
<tr>
<th>Survey</th>
<th>RANDS 1</th>
<th>RANDS 2</th>
<th>RANDS 3</th>
<th>RANDS 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel</strong></td>
<td>Gallup</td>
<td>Gallup</td>
<td>AmeriSpeak</td>
<td>AmeriSpeak</td>
</tr>
<tr>
<td><strong>Completed Surveys</strong></td>
<td>2,304</td>
<td>2,480</td>
<td>2,646</td>
<td>3,442</td>
</tr>
<tr>
<td><strong>Completion Rate</strong></td>
<td>23.5%</td>
<td>30.1%</td>
<td>62.2%</td>
<td>70.0%</td>
</tr>
<tr>
<td><strong>Cumulative Response Rate</strong></td>
<td>U- k- ow-</td>
<td>U- k- ow-</td>
<td>18.1%</td>
<td>14.0%</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>Web</td>
<td>Web</td>
<td>Web</td>
<td>Web</td>
</tr>
<tr>
<td><strong>Survey Focus</strong></td>
<td>Health Co- dito- s a- d Behaviors</td>
<td>Health Co- dito- s a- d Behaviors</td>
<td>Disability a- d Opioids</td>
<td>Disability a- d Opioids</td>
</tr>
</tbody>
</table>
Overview of completed rounds of RANDS during COVID-19

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dates</strong></td>
<td>6/9/20-7/6/20</td>
<td>8/3/20-8/20/20</td>
<td>5/17/21-6/30/21</td>
</tr>
<tr>
<td><strong>Panel</strong></td>
<td>AmeriSpeak</td>
<td>AmeriSpeak</td>
<td>AmeriSpeak</td>
</tr>
<tr>
<td><strong>Completed Surveys</strong></td>
<td>6,800</td>
<td>5,981</td>
<td>5,452</td>
</tr>
<tr>
<td><strong>Completion Rate</strong></td>
<td>78.5%</td>
<td>69.1%</td>
<td>69.5%</td>
</tr>
<tr>
<td><strong>Cumulative Response Rate</strong></td>
<td>23.0%</td>
<td>20.3%</td>
<td>11.8%</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>Web and phone</td>
<td>Web and phone</td>
<td>Web and phone</td>
</tr>
<tr>
<td><strong>Survey Focus</strong></td>
<td>COVID-19</td>
<td>COVID-19</td>
<td>COVID-19</td>
</tr>
</tbody>
</table>
Calibration
Background

- Combining web-based panel surveys with high quality reference data can improve estimates of national health outcomes
- Calibration to the reference survey reduces selection bias (Taylor, 2000; Terhanian and Bremer, 2000)
Calibration Approaches

- **Raking**
  - Iterative method of adjusting the sample weights to reflect external population counts
  - Specified measure of convergence (e.g., number of iterations, percentage tolerance)

- **Propensity score (PS)-based methods** (matching, weighting, stratification)
  - Adjusts for nonresponse bias by modeling the probability of inclusion ($p$) in terms of survey covariates
  - Flexibility in model formation (e.g., interactions, higher order terms)
Considerations

- Variable selection
  - Demographic variables
  - Variables that may identify differences between respondents in the target survey and reference survey
  - Variables associated with the outcome
- Missing data
- Alignment of calibration variables in target and reference surveys
Data Quality Checks

- Descriptive statistics of weights
  - Compare distributions of weights
  - Identify outliers
- Balance of outcome among covariates in target and reference datasets
- Convergence of calibration method/model
- Assess calibrated estimates and standard errors
Calibration in RANDS Data

- RANDS panel weights have been calibrated to the NHIS sample adult weights
- Annual NHIS data from corresponding RANDS year used for calibration (or most recently available public data)
- Calibration variables have included selected demographic and health variables
- PS-based methods and raking have been used for calibration research, although raking was used to produce calibrated weights for RANDS during COVID-19
- After calibration, adjusted RANDS estimates are generally closer to NHIS estimates
Summary

- RANDS is ...
  - A series of probability-sampled commercial panel surveys
  - Designed for methodological research purposes, including calibration research to improve estimates of health outcomes
  - Flexible and was quickly adapted to report on the COVID-19 pandemic
- The upcoming session presentations provide specific uses and comparisons from RANDS rounds
https://www.cdc.gov/nchs/rands

Katherine Irimata
kirimata@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the National Center for Health Statistics, Centers for Disease Control and Prevention.
References