From Landline to Online
Why and How a National Household Survey Transitioned Modes

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This presentation is intended to promote the exchange of ideas. The views expressed during the presentation and in presentation materials are part of ongoing research and analysis and do not necessarily reflect the position of the U.S. Department of Education.

Mode Changes in NHES

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<tbody>
<tr>
<td>Sample</td>
<td>RDD</td>
<td>ABS</td>
<td>ABS</td>
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<tr>
<td>Recruitment</td>
<td>Phone</td>
<td>Letter</td>
<td>Letter</td>
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<tr>
<td>Data collection</td>
<td>Phone</td>
<td>Paper</td>
<td>Web and paper</td>
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</tbody>
</table>
Acknowledgements

- Former NHES Project Officers
  - Sarah Carroll, Chris Chapman, Gail Mulligan, Andy Zukerberg, Kathryn Chandler
- Agencies and firms involved in NHES mode research
  - U.S. Census Bureau, American Institutes for Research (AIR), Westat
- Consultants
  - Paul Lavrakas, Expert Panel members

Agenda

I. NHES background
II. Random-digit dial design 1991 - 2007
III. 2012 & 2016 address-based sample mail design
IV. NHES:2019 sequential multi-mode design
V. Summary within Total Survey Error (TSE) framework
Section I.

NHES BACKGROUND

What Is the National Household Education Surveys Program (NHES)?

• Sponsored by the National Center for Education Statistics (NCES), within the U.S. Department of Education (ED)
• Measures phenomena not efficiently measured through institutions such as schools
• Cross-sectional survey every 2-3 years, with rotating survey topics
• Adult respondents; most often samples children
• Two-stage with a household-level screener and sampled person-level topical
NHES Surveys

<table>
<thead>
<tr>
<th>Data Collection Years</th>
<th>Early Childhood Program Participation</th>
<th>School Readiness</th>
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About young children

- Early Childhood Program Participation
- School Readiness

About school-aged children

- Before- and After-School Programs and Activities
  - 1999, 2001, 2005
- School Safety and Discipline
  - 1993
- Parent and Family Involvement in Education

About adults

- Adult education
- Credentials for work
  - 2016
- Civic Involvement
  - 1996, 1999
- Household Library Use
  - 1996

Uses of NHES Data

**Brookings**

**Executive Summary**

How much do parents spend on center-based daycare and preschool for their young children? In other words, what is the market price of these services? This answer is important for parents, government, policymakers, and providers.

Using nationally representative data from the 20th Early Childhood Program Participation Survey, we calculate hourly and annualized rates for parents who purchase at least eight hours a week of center-based care for a child under five who does not have a disability and does not receive financial help to pay the fees. The results are analyzed by age of child, region of country, parental education, parental income, and hours of attendance.

**Data Snapshot: Who Are the Nation’s Homeschoolers?**

A recently released batch of federal data offers a portrait of the nation’s homeschool population, including the backgrounds of students and their families’ reasons for choosing that option.

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**Uses of NHES Data**

<table>
<thead>
<tr>
<th>Uses of NHES Data</th>
<th>Data Collection Years</th>
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<tr>
<td><strong>Random Digit Dial phone collection</strong></td>
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<td><strong>Address-Based Sample mail collection</strong></td>
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<tr>
<td><strong>Address-Based Sample sequential mixed-mode: web, then mail collection</strong></td>
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Section II.
RANDOM-DIGIT DIAL DESIGN
1991 - 2007

NHES:2007 Design
• Conducted by telephone with Computer-Assisted Telephone Interviewing (CATI)
• Collected data for three surveys
  – School Readiness (SR) survey (sampling children age 3-6 and not yet in kindergarten)
  – Parent and Family Involvement in Education (PFI) survey (sampling children in K-12 grades or grade equivalent)
  – Adult Education for Work-Related Reasons (AEWR) survey collected but not released
NHES:2007 Design - Continued

- Random-digit-dial survey
- Commercial frame of landline telephone numbers
- n = 278,490
  - phone numbers in areas that were at least 20 percent Black or 20 percent Hispanic oversampled
- Within-household sampling allowed for up to 1 SR sample member, up to 1 PFI sample member, and up to 1 AEWR sample member to be selected per household.

NHES:2007 Recruitment Strategy

Advance letter\(^1\) with $2\(^2\) to phone numbers with address matches OR Interactive Voice Response (IVR) pre-notification\(^3\)

Up to 20 phone calls to sampled phone number

\(^1\)Advance letter found to be effective in NHES:1996 field test - see Brick, Collins, and Chandler 1997.
\(^2\)$2 prepaid incentives found to be effective in NHES:2003 experiment - see Brick et al. 2006.
\(^3\)IVR prenotification tested experimentally; no effect on response rates found - see, Hagedorn et al. 2008.
Screener response rate
Year of NHES random-digit dial telephone administration

NHES Program Screener Unit Response Rates 1991-2007

NHES from RDD Phone to ABS Mail – 2007 to 2012 Redesign Motivations

- Ten percentage point drop-off in screener unit response rates between 2005 and 2007
- NHES:2007 Adult Education for Work-Related Reasons (AEWR) survey was cancelled for low response rates
  - 62 percent response for completed AEWR interview * 53 percent screener response = 33 percent overall unit response rate
- Random-digit dial phone coverage of households waning
Percent of Adults & Children in Wireless-Phone-Only Households: U.S. 2003-18


NHES from RDD Phone to ABS Mail – 2007 to 2012 Redesign Next Steps

- Westat developed an Address-Based Sample design for NHES
- Methodological expert panel meetings conducted in January 2009 and February 2010
- NHES team developed a plan for a 2009 Pilot Test and a 2011 Field Test
NHES from RDD Phone to ABS Mail – 2007 to 2012 Redesign Timeline

NHES:2007
Last RDD phone administration

2009 Pilot Test for ABS mail administration

2011 Field Test for ABS mail administration

NHES:2012
First ABS mail administration

Section III.

NHES:2012 ADDRESS-BASED SAMPLE, MAIL DESIGN
NHES:2012 Design

- Recruitment and data collection conducted by mail
- Self-administered paper screener instrument mailed out, mailed back
- Fielded two surveys, mailed out and back
  - Early Childhood Program Participation (ECPP) survey (sampling children age 0-6 and not yet in kindergarten)
  - Parent and Family Involvement in Education (PFI) survey (sampling children in K-12 grades or grade equivalent)

NHES:2012 Design - Continued

- Address-based sample using commercial frame of addresses
- n = 159,994
  - addresses in areas that were at least 24 percent Black or 40 percent Hispanic oversampled
- Within-household sampling allowed for only one member to be selected per household
  - Early Childhood Program Participation OR Parent and Family Involvement.
NHES:2012 Screener-Stage Recruitment Strategy

To all 159,994 starting sample addresses

Advance letter 5-6 days
First screener questionnaire packages w/ $5 7 days
Screener thank you/reminder postcards

1st screener nonrespondents
Second screener questionnaire 15-16 days

1st and 2nd screener nonrespondents
Third screener questionnaire sent by FedEx or USPS and automated reminder telephone calls 19-20 days

1st, 2nd & 3rd screener nonrespondents

NHES:2012 Topical-Stage Recruitment Strategy

All screener respondents with eligible sample member for ECPP or PFI

First topical questionnaire packages w/ $5 or $15
Topical thank you/reminder postcards

1st topical nonrespondents
Second topical questionnaire 15-16 days

1st and 2nd topical nonrespondents
Third topical questionnaire sent by FedEx or USPS and automated reminder telephone calls 19-20 days

1st, 2nd & 3rd topical nonrespondents
Fourth topical questionnaire 21-22 days
How Was the NHES:2012 Design Developed?

- ABS sample frame, recruitment and data collection by mail
- Advance letter
- Screener incentives
- Topical incentives
- Use of FedEx
- Questionnaire design


- Concerns about two-stage design
- Reluctance to abandon RDD completely
  - Dual-frame RDD and ABS would allow analysis of
    - Mode effects
    - Response propensities by mode
    - Temporal changes in estimates, holding survey design constant
- Recommendation against web survey
  - might not improve response and might result in more bias
Why NHES:2012 ABS Sample Frame and Mail Mode?- Response Rate Results

- Screener response rate higher in 2009 test than in NHES:2007
  - 59 percent vs. 53 percent
  - As high as 64 percent for a version of the screener that included the least number of questions
- Topical response rates close to NHES:2017 rates
  - PFI survey 73 percent vs. 74 percent
  - ECPP survey 70 percent vs. SR survey 77 percent


Why Not Include Some Phone Nonresponse Follow-Up with the Mail Mode?

- Experimentally compared nonresponse follow-up using phone to mail
  - Results indicated that mail was more cost-effective and provided higher response
- Further testing compared third screener nonresponse follow-up by mail versus phone for households predicted to speak a language other than English
  - Found little overall improvement in response.

SOURCE: Montaquila, J., Brick, M, and Williams, D. 2010
How Does NHES Recruit and Collect Data From Non-English Speakers by Mail?

- Resources constrain questionnaires to English and Spanish-language only
- Bilingual package materials include both an English screener and Spanish screener
- Two sources of information about addresses used to identify households in need of bilingual materials
  - Hispanic surname
  - Census tract information about household English speakers

Why an Advance Letter in NHES:2012?

- Experimented with sending an advance letter or not for the screener
- Found earlier response among sample members receiving the advance letter
**Advance Letter Experiment Results**

Letter improved response at first mailing, “wave one,” but value diminishes with additional contacts.

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**Why Prepaid $5 Screener Incentives in NHES:2012?**

- Experiment testing $5 v. $2 prepaid screener incentives showed higher response at $5, particularly for addresses receiving bilingual mailings.
  - $5 also encouraged earlier response.
- Experiment testing use of a U.S. Department of Education magnet as a nonmonetary screener incentive was ineffective.

SOURCE: Han, Montaquila, and Brick 2013
For More Information About Screener Incentive Experiments

- Differential screener incentives
  - Jackson and McPhee 2017
  - Jackson, McPhee, and Lavrakas 2019
- Web-based screener incentives
  - Medway, Noel, and Guarino 2017

Why Prepaid $5 Topical Incentives in NHES:2012?

- Experimental results testing $0, $5, and $15 prepaid topical incentives to random subsamples of screener responders showed a response benefit of prepaid incentives at the topical stage.
- Further testing of topical incentives at $0, $5, $10, $15, $20 found subgroup differences.
First Prepaid Topical Incentive Experiment

$15 elicited the highest topical response rates.

Topical prepaid incentive amounts

SOURCE: Montaquila, J., Brick, M, and Williams, D. 2010

Second Prepaid Topical Incentive Experiment

SOURCE: Han, Montaquila, and Brick 2013
Why Pay for FedEx in NHES:2012 Third Mailings?

- Experimental results focused on Priority Mail vs. FedEx and found that FedEx outperforms Priority Mail.
- Analysis focused on Priority Mail vs. FedEx found that FedEx particularly boosts response among screener late responders.
Why Pay for FedEx in NHES:2012 Third Mailings?

Response rate of late responders by mailing treatment

<table>
<thead>
<tr>
<th></th>
<th>Percent responding to screener</th>
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<tbody>
<tr>
<td>Fedex</td>
<td>29</td>
</tr>
<tr>
<td>Priority mail</td>
<td>23</td>
</tr>
</tbody>
</table>


How Was the Questionnaire Design for NHES:2012 Finalized?

- Experimented with a “core” screener, asking for the information we want, a “screenout screener” asking for the least amount of information, and an “engaging” screener, designed to feel less administrative
- The screenout screener had the best results
First Screener Experiment Results

Screener with the highest response rate had the fewest questions. See also Williams, Brick, Montaquila, and Han 2014.

SOURCE: Williams, Montaquila, Brick, and Hagedorn 2010
How Was the Questionnaire Design for NHES:2012 Finalized?

- Other experiments included asking for names of children on the screener vs. not asking for names of children at all, switching screeners in nonresponse follow-up, asking for phone number or not
- Skip pattern designs
  - Color of skip instruction, instruction box
  - Response option order of no/yes vs. yes/no
- Question item-specific split ballot experiment

See Hastedt, Williams, and Billington 2012; Knecht, Grady, and McPhee 2011; and Williams, Brick, Montaquila, and Han 2014 for detailed results.
Section IV.

**NHES:2019 SEQUENTIAL MIXED-MODE DESIGN**
NHES from ABS Mail to Web-First Sequential Mixed-Mode – 2016 to 2019 Redesign Timeline

NHES:2016
ABS administration with web experiment of 35,000 addresses/206,000 sampled addresses

2017 Web Test

NHES:2019
First web-first sequential mixed-mode administration

NHES from ABS Mail to Web-First Sequential Mixed-Mode – 2016 to 2019 Motivations

- Reduce need for two survey stages for responding households
  - Leverage “on-the-fly” sampling
- Increase data quality with programmed skip patterns, range checks
- Modernize survey, decrease printing and postage costs
NHES:2019 Design

- Conducted by mail (mail out, mail back paper) or web (in one stage) or inbound phone call (in one stage)
- Recruitment: Two web invitations followed by two paper invitations
- Fielding two surveys
  - ECPP (sampling children age 0-6 and not yet in kindergarten)
  - PFI (sampling children in K-12 grades or grade equivalent)

NHES:2019 Design - Continued

- Address-based sample using commercial frame of addresses
- \( n = 205,000 \)
  - addresses in areas that are at least 24 percent Black or 40 percent Hispanic oversampled
- Within-household sampling chooses only one sample member to be selected per household (ECPP or PFI).
NHES:2019 Screener-Stage Recruitment Strategy

To all 205,000 starting sample addresses

Advance letter 6 days
First screener letter asking for web completion w/ $5 8 days
Screener thank you/reminder pressure-sealed mailers

1st screener nonrespondents 22 days
Second screener letter asking for web completion 29 days
1st and 2nd screener nonrespondents
Third screener mailing with questionnaire sent by FedEx and automated reminder telephone calls 28 days
1st, 2nd & 3rd screener nonrespondents

Fourth screener questionnaire

NHES:2019 Topical-Stage Recruitment Strategy

All screener respondents with eligible sample member for ECPP or PFI who completed screener by paper instead of web

First topical questionnaire packages w/ $5 or $15 7 days
Topical thank you/reminder postcards

1st topical nonrespondents 14 days
Second topical questionnaire 21 days
1st and 2nd topical nonrespondents
Third topical questionnaire sent by FedEx or USPS and automated reminder telephone calls 21 days
1st, 2nd & 3rd topical nonrespondents

Fourth topical questionnaire
How Was the NHES:2019 Design Developed?

- Web mode
- Envelope size
- Questionnaire design
- Experiments to inform future collections

Why Use Web in NHES:2019?

- Experiment of the approach of 2 web invites followed by 2 paper survey mailings gave higher overall response than paper.
- Mode effects analysis on NHES:2016 data suggested no pattern in measurement bias.
- Web Test demonstrated that web-based operations were feasible.
### NHES:2016 Web Experiment Results

<table>
<thead>
<tr>
<th></th>
<th>Early Childhood Program Participation</th>
<th>Parent and Family Involvement in Education</th>
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<tbody>
<tr>
<td></td>
<td>Mail-only</td>
<td>Mixed-mode</td>
</tr>
<tr>
<td>Screener</td>
<td>67.2</td>
<td>62.1</td>
</tr>
<tr>
<td>Topical</td>
<td>71.5</td>
<td>83.6</td>
</tr>
<tr>
<td>Overall</td>
<td>48.0</td>
<td>51.9</td>
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### NHES:2017 Web Test Results

- Screener response rate, with only 3 web mailings instead of 4 mailings, was 43 percent.
- Topical response rates were:
  - 75 percent for the PFI -Homeschooled topical
  - 90 percent for the PFI-Enrolled topical
  - 87 percent for the ECPP topical
What Changes Were Made to Mailing Strategy for NHES:2019?

- For 1st and 2nd screener mailings, avoided the expense of larger envelopes based on 2017 Web Test results.
- No difference in screener response rates when sending web invitation letter with a letter-sized envelope vs. 8 X 11 envelope

SOURCE: Medway, Noel, and Guarino 2017

How Was the Web Questionnaire Developed for NHES:2019?

- Results of a split ballot experiment in the screener helped us refine the design of the web-based screener for NHES:2019
2017 Web Test Experiment Results – Split Ballot Screener Experiment

- Mimic paper screener in web by asking all questions about one household person vs.
- Adopt ACS model of asking one question (e.g. sex) about each person

Screener version did not significantly impact the screener response rate or breakoff rate.
It also did not have a significant effect on the topical response rates.
ACS version yielded slightly more reports of children eligible for topical surveys and also slightly more missing or inconsistent data.

SOURCE: Medway, Noel, and Guarino 2017
NHES:2019 Experiments to Inform Future Collections

- Advance mailing campaign vs. advance letter vs. no advance letter
- “Choice-plus”\(^1\) experiment, in which sample members are provided a contingent incentive (testing $10 and $20) to respond by web while given choice of web or paper
- Opt-out screener
- Modeled paper-only group
- Materials tailored to Spanish-speaking households
- Timing of the FedEx mailing to optimize response and cost savings

\(^1\)Biemer et al 2018

Section V.

SUMMARY WITHIN TOTAL SURVEY ERROR (TSE) FRAMEWORK
Summary

• In NHES context, change is slow, including mode changes.
  – Experimentation helps us evaluate changes to collection strategies before we implement them for national collections.
• As a general population household survey, nonresponse is our biggest challenge and shapes most of what we do.

Total Survey Error Framework and NHES

Summary - Continued

- Coverage error motivated NCES to abandon the RDD sample frame
- Nonresponse error eclipses other concerns in current survey environment
  - Response rates and response bias
- Measurement error also a key concern, though often costly and time-intensive to study, with less clear implications for survey design, threatening data timeliness

Summary - Continued

- Accountability for validity, sampling error, and processing error is born by agencies and firms collecting NHES data
Summary - Continued

• Other quality indicators remain important
  – Timeliness, release of data within one year of end of collection, is a closely monitored NCES goal
  – Thorough and accurate documentation remains an important NCES Statistical Standard.

• New approach to understanding cost
  – Census Bureau cost by case analysis for NHES:2019

For More Information

Survey website
https://nces.ed.gov/nhes/

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References


References - Continued


References - Continued


