



**INSTITUTE FOR SOCIAL RESEARCH
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UNIVERSITY OF MICHIGAN

Nonresponse Bias Analysis Methods: A Taxonomy and Summary

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Overview

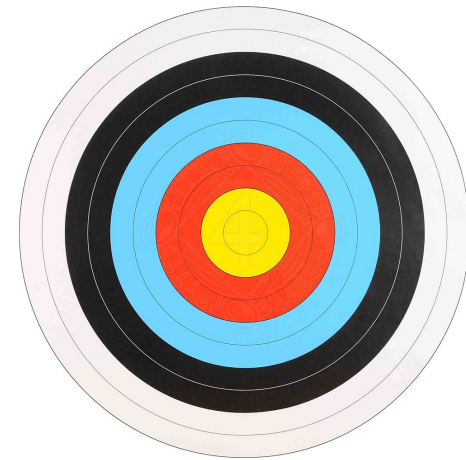
- Background
- Five approaches
 - **Response rate** comparisons
 - **Subgroup response rate variation**
 - Comparisons to **external estimates**
 - Changes due to **level of effort**
 - Contrasting **alternative adjustment strategies**
- Conclusion

Background

- Nonresponse bias concerns have grown
- Nonresponse bias **evaluation** has been a burgeoning area of research
 - Groves (2006) provides useful taxonomy
- **OMB requires nonresponse bias analysis** for surveys with response rates lower than 80%
- FCSM Nonresponse Bias Subcommittee report: *“Best Practices for Nonresponse Bias Reporting”*

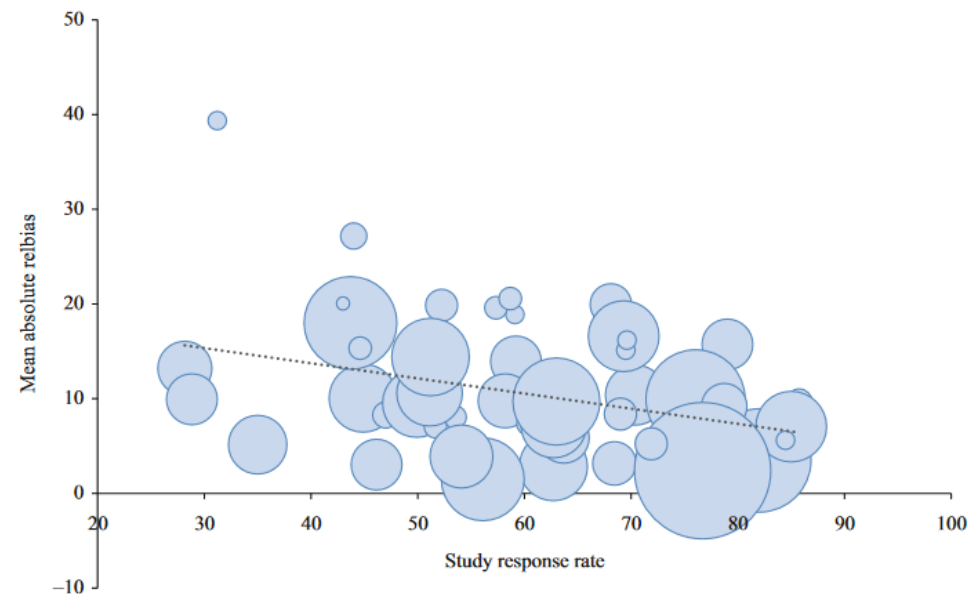
Background

- Nonresponse bias analysis is driven by the **available data**:
 - Sampling frame/auxiliary data
 - Paradata
 - Survey data
 - Administrative data
- Want data that are “closer to the target”



1. Response Rates

- Response rates are a valuable indicator
 - Not the only, and maybe not the best
- Groves and Peytcheva (2008)
 - “NR rate by itself is a poor predictor of...NR bias”
- Brick and Tourangeau (2017) reanalysis

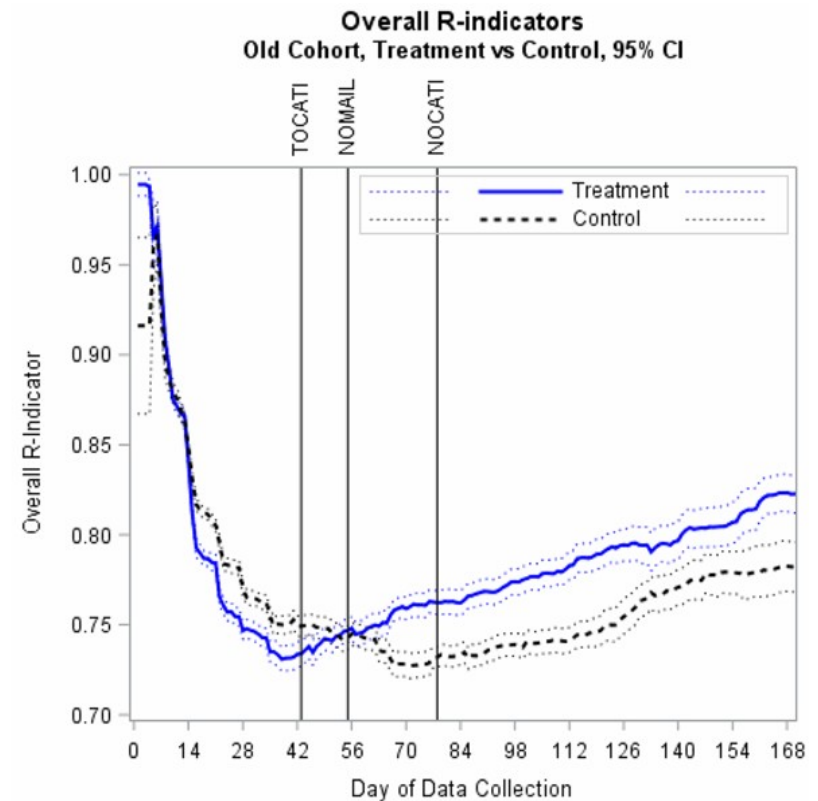


2. Subgroup Response Rate Variation

- We can also think of as comparisons --
responders vs nonresponders
- Using sampling frame, auxiliary, and paradata
 - Ideally, proxy- Y variables
- Controlling variation seems helpful
 - Assume balanced response is better
 - Assume better than simply adjusting

2. Subgroup Response Rate Variation

- Example indicator: R-Indicator (Schouten, et al., 2009)
 - Variation of estimated response probabilities
 - $1 - 2SD(\hat{\rho}_i) \rightarrow 1$ is perfect balance
 - *Schouten et al. (2016)*
 - Simulation study: increases in sample balance are associated with reductions in bias



Coffey, et al., 2019

2. Sugroup Response Rate Variation

- Comparison of responders and sample
- Based on administrative data:

Survey variable	Sample	Respondent
Cumulative GPA	3.18	3.26
Avg. weekly Campus Rec Facility visits	0.78	1.02***
Avg. PE classes skipped	2.98	2.95
Greek life participant	0.2	0.18*
Residential village participant	0.49	0.54

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standish and Umbach (2019) ⁸

3. Comparisons to External Estimates

- Poststratification factors
- Comparison so other surveys

HINTS 4 Cycle 1
compared to
NHIS/MEPS
(abridged from
Maitland, et al.,
2017)

Characteristic	Final calibrated estimate	Bench-mark estimate	Bench-mark source
Access to Internet	78.1	70.9*	NHIS
Excellent, very good, or good health	84.9	86.9	
Never visited doctor	21.2	19.0*	
Looked for health information on the Internet (Internet users only)	78	57.9*	
Health professionals always explain things in a way you understand	61	61.4	MEPS
In past 12 months, health professionals always spend enough time with you	44.6	52.4*	

*p<0.05

4. Variation within survey

- Comparison of estimates by level-of-effort
 - Special nonresponse follow-up studies

- Example:

- Early vs Late responders in Canadian Addiction Survey
- CATI → Completion within 1-6 (Early) vs 7+ (Late) attempts
- *Zhao, et al., (2009)*

Substance	Early	Late
Alcohol		
12 months*	77.57	83.24
Chronic risky use*	6.25	8.23
Heavy weekly use	4.69	5.55
Cannabis		
Lifetime*	42.94	47.88
12 months*	13.21	16.35
Any illicit drug		
Lifetime*	43.66	48.47
12 months*	13.64	16.69

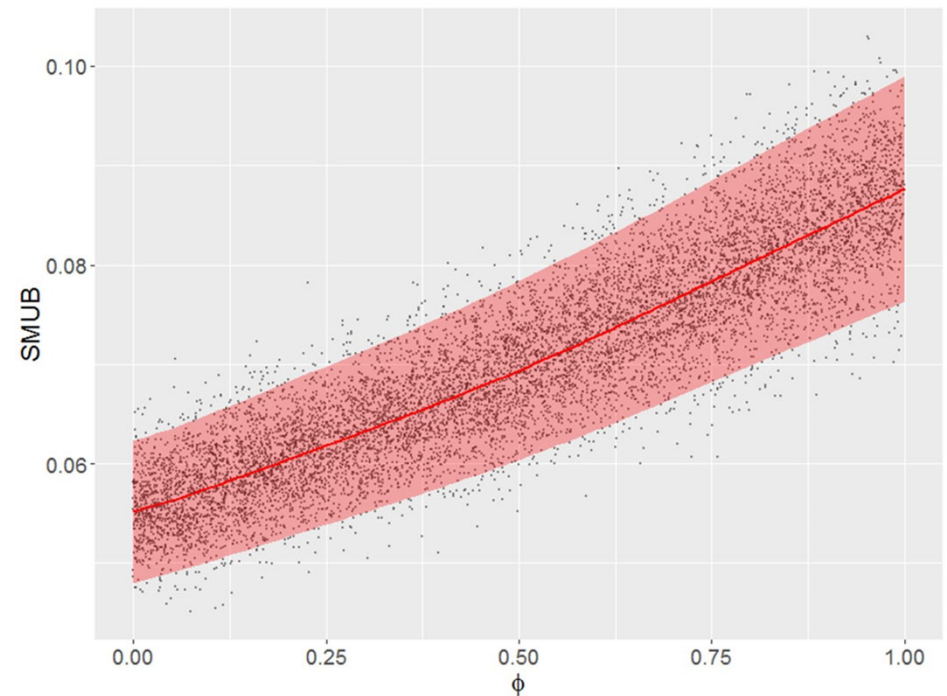
*p<0.05

4. Variation within survey

- Which **design features** reduce the risk of nonresponse bias?
 - *Groves and Heeringa (2006)*: Change design when current design no longer leads to changes in estimates – “phase capacity”
 - *Peytchev et al. (2009)*
 - More of the same (e.g. additional call attempts) does not lead to changes in estimates
 - Changing the protocol in a way that addresses the mechanism leads to changes in estimates
 - Example: Reduced length questionnaire

5. Contrasting post-survey adjustments

- “Sensitivity” to nonresponse and poststratification adjustment model selection
- *Little, et al. (2020)*
Standardized Measure of Unadjusted Bias (SMUB)
 - Using Pattern-Mixture Models to estimate bias under different assumptions about nonrespondents, including NMAR



Lessons Learned

- Choose design features that minimize risk of nonresponse bias
 - Reduce the impact of multiple mechanisms:
 - Topic not interesting, Too little time, etc.
- Multiple approaches to evaluation is a best practice
- Check sensitivity to model assumptions
- Allow users to evaluate risks relative to their analyses

Thank You!

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