



Alternative Sample Selection and Data Collection Strategies for Balancing Cell Phone
Response Distribution Across County/Region Level Geographies in a Dual Frame
Telephone Survey

AAPOR 2013 Methodological Briefs: Cell Phones

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Problem Statement

Targeting geographic areas such as counties, even large metropolitan counties, with a cell phone sample frame is difficult.

In this methods brief, we explore the use of existing geographic estimators to improve sample selection and data collection strategies to balance cell phone responses across small areas.

Problem Statement

Case Study: 2012 Ohio Medicaid Assessment Survey (OMAS)

- State of Ohio; family health insurance and access to care study; conducted May-Sept. 2012.
- RDD dual frame (overlapping); 22,929 interviews; ~25% cell
- Estimates desired at the county and region (group of counties) level, for ethnic minorities, and families with children living in poverty
- County level stratified sample for landline frame
- State wide cell phone sample
- 30.2% RR3 for landline; 24.4% RR3 for Cell Phone

Options - Balancing Cell Phone Completes

- Population Counts – Estimate cell phone completes by small area population counts
- Cell Phone Only estimates
 - NHIS models estimate CPO/CPM rates for states and large counties
 - Sample vendors estimate CPO rates for most counties
- Rate Center - geographic area from which cell phone number was activated
 - Rate center now tied to each cell phone number
 - Rate center can be mapped to other geographies to help predict the “home” location of the cell phone user

Comparing options for balancing cell phone completes

Using different estimates for cell phone usage in Ohio leads to different predictions for the number of cell phone completes expected on the OMAS

In the Northeast, for example, estimates for cell phone completes vary widely depending on which estimate is used

Medicaid Regions are defined at the county level and group Ohio's 88 counties into 8 geographic clusters.

Medicaid Region	Estimate of cell completes based on population totals	Estimate of cell completes based on %COP	Estimate of cell completes based on rate center
Central	1039	1162	1056
East Central	695	675	745
Northeast	1048	891	721
Northeast Central	257	222	322
Northwest	573	569	626
Southeast	302	249	253
Southwest	772	887	940
West Central	507	536	527

Rate Center

- Rate Center holds some promise as a stratification variable because it is assigned to every cell number
- MSG mapped the rate center to Ohio county for cell numbers selected for OMAS sample
- Using self-reported location, we measure classification error:
 - Incorrect state=7.7%
 - Classification error at the county level=33%
 - In Hamilton County the false-positive rate was 48%

Correcting Frame Misclassification

- Hamilton County (Cincinnati) frame estimate = 14.6%

Hamilton, OH	Respondent	
Frame	In county	Not in county
In county	428	400
Not in county	22	4341

- Correcting misclassification using survey data:
 - $P(u=c) = P(u=c|x=c,R)*P(x=c) + P(u=c|x^{\wedge}=c|R)*P(x^{\wedge}=c)$
 - Where u is the true classification, c is the county of interest, R=respondent, x = frame classification
 - $P(u=c) = 428/828*(.146) + 22/4363*(1-.146) = 0.075+0.004=0.078$ or 7.8%

OMAS Results with Adjusted Rate Center

MedicaidRegion	Estimate of cell completes based on population totals	Estimate of cell completes based on %COP	Estimate of cell completes based on rate center	Estimate of cell completes based on adjusted rate center	Cell achieved - expected based on modified rate center	Non-response ratio
Central	1039	1162	1056	1094	39	1.04
East Central	695	675	745	701	-21	0.97
Northeast	1048	891	721	678	-77	0.89
Northeast Central	257	222	322	309	-37	0.88
Northwest	573	569	626	633	8	1.01
Southeast	302	249	253	254	-31	0.88
Southwest	772	887	940	978	42	1.04
West Central	507	536	527	544	77	1.14

Sample Design for Next OMAS

- Using 2012 survey data we can estimate rate center error and non-response by county to stratify the cell phone sample
- Allocate desired number of cell phone completes to counties based on corrected rate center distribution to set expectations for data collection

Steps to Determine Sample Size by County

- Adjust nominal sample size by following adjustments to get starting sample size of cell phone numbers
 1. Frame error adjustment: ratio of initial rate center distribution and corrected rate center distribution
 2. Response rate adjustment: expected aggregate response rate times the ratio of prior survey number of completes over prior survey expected number of completes
 3. Out of state adjustment: ratio of number of contacted persons in rate center county indicating they lived out of state over number of contacted persons in rate center county
 4. Ineligibility adjustment: aggregate ineligibility adjustment specific to study design other than out of state adjustment

Addressing Differential Non-Response

MedicaidRegion	Estimate of cell completes based on adjusted rate center	Cell achieved - expected based on modified rate center	Non-response ratio
Central	1094	39	1.04
East Central	701	-21	0.97
Northeast	678	-77	0.89
Northeast Central	309	-37	0.88
Northwest	633	8	1.01
Southeast	254	-31	0.88
Southwest	978	42	1.04
West Central	544	77	1.14
Metro	2737	-4	1.00
Rural Appalachian	846	-56	0.93
Rural Non-Appalachian	803	42	1.05
Suburban	806	17	1.02

Concluding Remarks

- Rate center, CO/CM estimates help set expectations in the field
- Adjusted rate center can improve sample design for repeating surveys
- Adjusted rate center helping us conduct further research on differential non-response patterns for cell frame
- Research limited to experience in Ohio