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Response burden and bias in the National Household Food Acquisition and Purchase Survey (FoodAPS-1): an empirical analysis based on the respondent feedback survey

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of Economic Research Service, or U.S. Department of Agriculture.

Outline

Introduction: FoodAPS-1 data collection

FoodAPS feedback survey questionnaire

Research questions

Model results for response bias, behavior change and response burden

Implications for future FoodAPS data collection

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FoodAPS Data Collection Week

Mon	Tues	Wed	Thu	Fri	Sat	Sun	Mon	Tue
0	1	2	3	4	5	6	7	8

- Screen
- Train HH
- Initial Interview (CAPI)

Household tracks food acquisitions in booklets and with scanner

PR calls to report

PR call to report

PR call to report

- Pick up
- Final Interview (CAPI)
- Feedback Survey

FoodAPS response rates

- Screening interview
  - 70.4% (unweighted)
  - 71.0% (weighted)*
- Main study
  - 44.5% (unweighted)
  - 43.2% (weighted)

  *Weighted with unadjusted sampling weights (inverse of probability of selection).

- FoodAPS feedback survey
  - 97.6%(unweighted, 4,712 out of 4,826)

Feedback survey questionnaire

- How often did you complete the meals and snack forms? (N=4624)
  - Everyday (72.2%)
  - More than once but not every day (18.1%)
  - Once before the end of the week (1.8%)
  - Once at the end of the week (4.2%)
  - Did not complete at all (3.7%)
- How easy or difficult was it to keep track of the foods you got? (N=4668)
  - Very easy (41.7%)
  - Easy (38.2%)
  - Neither easy nor difficulty (14.3%)
  - Difficult (4.7%)
  - Very difficult (1.2%)

Feedback survey questionnaire

- During the past week, did you (or other household members) change the way you got food because you were taking part in this study? (N=4,666)
  - Ate out more often (2.4%)
  - Ate out less often (3.6%%)
  - Did more food shopping (2.5%)
  - Did less food shopping(3.5%)
  - Bought a specific item(s) just to be able to scan it (1.2%)
  - Avoided specific items so you wouldn't have to scan them (0.5%)
  - Other changes (2.7%)
  - No, did not change (89.3%)

Research questions

- Is the FoodAPS Primary Respondent (PR)'s delay in food acquisition reporting associated with his/her actual response burden?

- Does the PR's participation in FoodAPS data collection change his/her food purchase and acquisition behaviors?

Response bias and response burden

- FoodAPS PR's response bias (binary outcome) is defined as failing to report his/her meals and snacks everyday (delay in reporting or no reporting)
  - 27.8% PRs did not report meals and snack daily

- FoodAPS PR's actual response burden is defined as feeling difficult or very difficult to keep tract of the food he/she got?
  - 5.9% PRs had difficulties in tracking their food.

Multilevel logistic models (MLM) for the associations between response bias and response burden

- **Model (I) with only PR's response burden**
  - Having difficulties in tracking food (yes vs no)

- **Model (II): Model I plus PR's demographics**
  - Sex: male vs female
  - Age (years): 18-24, 25-29, …, 80+
  - Race/ethnicity: Non-Hispanic white, black, AIAN, Asian, HNPI, other single race, two or races, Hispanic

- **Model (III): Model II plus county-level urban-rural status**
  - NCHS county urban-rural continuum (2013):
    - Metro: large central, large fringe, medium and small
    - Non-metro: Micropolitan, noncore

Fixed effect odds ratio (OR) and random effect variance estimates of MLM for the associations between response bias and response burden

Model		I	II	III
Fixed effects	Predictor	OR (95% CIs)	OR (95% CIs)	OR (95% CIs)
	Having difficulties (Yes vs No)	4.31 (3.30, 5.64)	4.07 (3.11, 5.33)	4.07 (3.10, 5.33)
Random effects	Cluster	Variance (SE)	Variance (SE)	Variance (SE)
	county	0.103 (0.038)	0.059 (0.030)	0.044 (0.026)
	tract(county)	0.071 (0.039)	0.040 (0.036)	0.045 (0.037)

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Implication for FoodAPS data collection

- PR's actual response burden, independent of his demographics, is a significant barrier for FoodAPS PR to report meals and snacks daily; the delay in recalling meals and snacks could introduce substantial bias in reporting events (missing, over-reporting, and underreporting

- Compared to rural counties (PSU), PRs from large central metro and micropolitan counties are more likely to delay in reporting meals and snacks, more field interventions are needs to minimize this adverse effect in data collection

PR food acquisition behavior change

- FoodAPS PR food acquisition behavior change (binary outcome) is defined as those PR reporting one or more food acquisition behavior changes during foodAPS data collection
  - 10.7% PRs reported food acquisition behavior

Multilevel logistic models (MLM) for the associations between behavior change and response burden

- **Model (I) with only PR's response burden**
  - **Having difficulties in tracking food (yes vs no)**

- **Model (II): Model I plus PR's demographics**
  - **Sex: male vs female**
  - **Age (years): 18-24, 25-29, …, 80+**
  - **Race/ethnicity: Non-Hispanic white, black, AIAN, Asian, HNPI, other single race, two or races, Hispanic**

- **Model (III): Model II plus county-level urban-rural status**
  - **NCHS county urban-rural continuum (2013):**
    - Metro: large central, large fringe, medium and small
    - Non-metro: Micropolitan, noncore

Fixed effect odds ratio (OR) and random effect variance estimates of MLM for the associations between behavior change and response burden

Model		I	II	III
Fixed effects	Predictor	OR (95% CIs)	OR (95% CIs)	OR (95% CIs)
	Having difficulties (Yes vs No)	1.90 (1.38, 2.64)	1.80 (1.30, 2.51)	1.77 (1.27, 2.46)
Random effects	Cluster	Variance (SE)	Variance (SE)	Variance (SE)
	county	0.078 (0.038)	0.041 (0.032)	0.014 (0.028)

The behavior change binary outcome did not any meaningful census tract-level correlations, thus census tract-level random effects were dropped for all MLMs for behavior change.

Implications for FoodAPS data collection

- **PR's actual response burden is significantly associated with behavior changes in food purchase and acquisition, which could introduce reporting bias in field data collection**

- **Compared to rural counties (PSU), PRs from large central metro counties were likely to experience food purchase and acquisition behavior changes**

What is next?

- **As expected, PR's actual response burden could increase underreporting and introduce substantial bias in field data collection.**

- **Additional analysis is needed to explore and identify what individual and/or local community factors could reduce and minimize the adverse effects of response burden during data collection.**
  - **Interviewer effects?**
  - **Employment status, language, household with children, or house size?**

Thanks you!

Questions?

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Fixed effect odds ratio (OR) estimates of MLM for the associations between response bias and response burden

Model		I			II			III		
Predictor	Subgroup	OR	95% CIs		OR	95% CIs		OR	95%	CIs
			LCL	UCL		LCL	UCL		LCL	UCL
Sex	Male				1.26	1.08	1.47	1.27	1.09	1.48
	Female (ref.)									
Age (years)	18-24 (ref.)									
	25-29				0.76	0.56	1.02	0.76	0.56	1.02
	30-34				0.95	0.71	1.27	0.95	0.71	1.27
	35-39				0.79	0.58	1.07	0.79	0.58	1.08
	40-44				0.69	0.51	0.94	0.69	0.51	0.94
	45-49				0.68	0.50	0.92	0.67	0.50	0.91
	50-54				0.67	0.49	0.91	0.67	0.49	0.91
	55-59				0.52	0.38	0.72	0.53	0.38	0.73
	60-64				0.55	0.39	0.77	0.55	0.39	0.78
	65-69				0.68	0.47	0.97	0.67	0.47	0.97
	70-74				0.89	0.59	1.34	0.89	0.59	1.35
	75-79				0.81	0.49	1.33	0.81	0.50	1.33
	80+				0.60	0.37	0.99	0.60	0.37	0.98
Race/Ethnicity	White (Ref.)									
	Black				1.51	1.23	1.86	1.49	1.22	1.83
	AIAN				1.33	0.61	2.90	1.28	0.59	2.78
	Asian				1.30	0.91	1.88	1.28	0.88	1.84
	HNPI				0.56	0.15	2.14	0.53	0.14	2.05
	Other race				1.08	0.48	2.45	1.04	0.46	2.35
	Multiple race				1.21	0.72	2.02	1.18	0.71	1.98
	Hispanic				1.80	1.48	2.18	1.71	1.40	2.09
Having difficulities	Yes	4.31	3.30	5.64	4.07	3.11	5.33	4.07	3.10	5.33
	No (ref.)									
County Urban Rural Status	Large central metro							1.49	1.07	2.08
	Large fringe metro							1.29	0.92	1.79
	Medium metro							1.12	0.79	1.58
	Small metro							1.24	0.84	1.84
	Micropolitan							1.67	1.17	2.38
	Noncore (ref.)									

Fixed effect odds ratio (OR) estimates of MLM for the associations between behavior change and response burden

Model		I			II			III		
Predictor	Subgroup	OR	95% CIs		OR	95% CIs		OR	95% CIs	
			LCL	UCL		LCL	UCL		LCL	UCL
Sex	Male				1.22	0.99	1.50	1.21	0.98	1.50
	Female (ref.)									
Age (years)	18-24 (ref.)									
	25-29				0.76	0.51	1.12	0.75	0.50	1.11
	30-34				0.97	0.66	1.42	0.97	0.66	1.41
	35-39				0.88	0.59	1.31	0.87	0.58	1.30
	40-44				0.65	0.43	0.99	0.65	0.43	0.98
	45-49				0.69	0.46	1.04	0.68	0.45	1.03
	50-54				0.52	0.33	0.81	0.51	0.33	0.80
	55-59				0.65	0.42	1.00	0.65	0.42	1.00
	60-64				0.49	0.30	0.81	0.50	0.31	0.82
	65-69				0.71	0.44	1.17	0.71	0.44	1.17
	70-74				0.47	0.24	0.93	0.48	0.25	0.95
	75-79				0.51	0.24	1.12	0.51	0.23	1.11
	80+				1.14	0.64	2.04	1.14	0.64	2.04
Race/Ethnicity	White (Ref.)									
	Black				1.76	1.35	2.29	1.71	1.31	2.22
	AIAN				0.61	0.15	2.57	0.59	0.14	2.50
	Asian				1.07	0.64	1.79	0.97	0.58	1.62
	HNPI				2.17	0.59	7.97	1.94	0.53	7.13
	Other race				3.56	1.58	8.03	3.18	1.41	7.21
	Multiple race				1.86	1.00	3.45	1.78	0.96	3.29
	Hispanic				1.59	1.23	2.06	1.43	1.10	1.86
Having difficulities	Yes	1.90	1.38	2.64	1.80	1.30	2.51	1.77	1.27	2.46
	No (ref.)									
County	Large central metro							1.89	1.22	2.91
Urban	Large fringe metro							1.37	0.88	2.14
Rural	Medium metro							1.56	0.99	2.45
Status	Small metro							1.47	0.89	2.43
	Micropolitan							1.30	0.80	2.12
	Noncore (ref.)									