

Comparison between Newly Proposed Response Rates and Current Response Rates for the TPOP Survey

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Fred Marsh III

U.S. Bureau of Labor Statistics, 2 Mass Ave., NE Room 3655, Washington, DC 20212

Marsh.fred@bls.gov

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Abstract

Currently, the Telephone Point of Purchase Survey (TPOPS) calculates three of the four Bureau of Labor Statistics (BLS) recommended response rates using a version of the American Association for Public Opinion Research's (AAPOR) RR4. These four BLS recommended response rates are Initiation, Collection, Estimation, and Total Survey. As part of an effort to incorporate consistent definitions with other Office of Prices and Living Conditions (OPLC) surveys, TPOPS is developing new response rates that will continue to satisfy BLS recommended response rates and satisfy more program needs.

Key Words : Response Rates

1. Introduction

TPOPS is an acronym used by the Bureau of Labor Statistics (BLS) to refer to the Telephone Point of Purchase Survey. The goal of this survey is to create a sampling frame and lower level weights for the Commodities and Services (C&S) part of the Consumer Price Index (CPI). In TPOPS telephone numbers are selected randomly and eligible respondents are asked to provide information about where they bought items and how much they spent during a given recall period for a selected group of items. The reported outlets form the frame of outlets from which a sample will be drawn for the corresponding items, and weights are derived using reported expenditures. Note TPOPS does not produce an index like the CPI C&S and Housing surveys. Therefore, some of the BLS standards for index response rates will not be applicable to TPOPS because TPOPS does not produce an index but a sampling frame.

1.1 How is TPOPS Collected?

The TPOPS collection process has two main attributes. These two attributes are sample frame (e.g. who gets called) and time frame (e.g. amount of time it takes to collect information).

The sample frame for TPOPS is the set of telephone numbers contained in the geographic area defined by the CPI survey. However, TPOPS is only interested in residential households. Therefore when the survey is

conducted, the survey must determine whether or not the respondent at the phone number is eligible for the survey (i.e. a member of a residential household). Understandably, this method of contact will result in many sample units with unknown eligibility (i.e. residential status undetermined).

The second attribute is time frame. This attribute is murkier because we have two different time frames existing together.

The first type of time frame is a TPOPS group – PSU group. A TPOPS group is a collection of TPOP categories. A TPOP category contains one to many C&S priced items. So generally speaking, we have 16 TPOPS groups that cover almost all priced items in the C&S portion of the CPI. The second component of the name is a PSU group. A PSU group is a collection of CPI PSUs (i.e. group of cities) that will ask their respondents the same TPOPS group. Consequently, we have 16 PSU groups or one PSU group for each TPOPS group. Lastly since each TPOPS group is asked every quarter, it will take a given PSU group 4 years to sample all TPOPS groups (i.e. 16 TPOPS groups * (1 quarter or 1/4 of a year)). Note because each PSU group asks a different TPOPS group each quarter, the entire U.S. sample for a given quarter represents all 16 TPOPS groups and all 16 PSU groups.

The second type of time frame is the duration of time a given respondent will be in the TPOP survey. The answer is a given respondent will be in the survey for 4 straight quarters (i.e. 4 Calls). Ideally we hope a given PSU group will be composed of 1/4 new respondents (i.e. Call 1), 1/4 second-time respondents (i.e. Call 2), 1/4 third-time respondents, and 1/4 fourth-time respondents. This ideal composition should create a fairly balanced work load from one quarter to the next. Furthermore, it should keep the response rates higher since first-time respondents will be more likely to cooperate than more seasoned respondents. Lastly because a given PSU group will change TPOPS group every quarter, a given respondent will answer different a different TPOPS group every quarter.

1.2 BLS's 4 Standard Index Response Rates

As part of an effort to incorporate more consistent definitions between the different surveys within the Office of Prices and Living Conditions (OPLC), BLS has developed some recommended general standards for how to create response rates¹. Recalling that TPOPS is not an index producing survey, TPOPS is not required to comply with all standard BLS index response rates.

BLS recommends as a standard that each index program calculate the following four rates:

- 1) *Initial Data Collection* or the proportion of units during the initial contact phase that agree to cooperate with the survey.
- 2) *Update Collection* or the proportion of units during the data collection phase that provided any information to the survey out of all cooperative units during the initiation phase.
- 3) *Update Estimation* or the proportion of units that provided usable information out of all cooperative units during the initiation phase.
- 4) *Total Survey* or the proportion of units that provided usable information out of all in-scope units.

BLS also recommends that each of these four rates be written in accordance with the following general definition of a response rate:

$$\frac{\text{\# of Cooperative or Usable Units}}{\text{\# of Eligible Units} + \text{\# of Units with Eligibility Undetermined}}$$

2. The Current TPOP Response Rates

Currently, TPOPS satisfies these BLS standards because the survey follows the BLS general response rate definition and creates 3 of the 4 principal rates. The exception is the Update Estimation response rate. TPOPS does not produce this rate because the survey has no index and thus no usable units to place into an index.

2.1 General Formula for TPOPS

In order to create these response rates, TPOPS chose a formula that would be compatible with the BLS general definition. The formula chosen was a simplified version of the RR4 function defined by the American Association for Public Opinion Research's (AAPOR)². The TPOPS simplified version of the RR4 formula is

$$\text{TPOPS (RR4)} = \frac{I}{(I + \text{NC} + R + e(\text{UN}))}$$

where:

- I = # of Successfully Interviews
- NC = # of Interviews that are Eligible but were Unsuccessfully Contacted (i.e. Non-Contacts)
- R = # of Interviews that are Refusals

UN = # of Interviews with Unknown Eligibility
e = Estimated Proportion of Unknowns that are Actually Eligible

2.2 Calculating the 3 Current Response Rates

1) Initial Date Collection:

Objective: The % of households that participate with the survey given this current quarter is their 1st quarter in the survey.

Formula:

$$\text{TPOPS (RR4)} = \frac{I_{\text{Call 1's Only}}}{(I + \text{NC} + R + e(\text{UN}))_{\text{Call 1's Only}}}$$

Example: If you are interested in quarter Q053, you would restrict the response rate to include only those respondents in the circled box below. Then you would determine the percentage of respondents that participated with the survey.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

2) Update Collection:

Objective: The % of households that participate with the survey given this is their 2nd, 3rd, or 4th quarter in the survey.

Formula:

$$\text{TPOPS (RR4)} = \frac{I_{\text{If Call 2, 3, or 4 Only}}}{(I + \text{NC} + R + e(\text{UN}))_{\text{If Call 2, 3, or 4 Only}}}$$

Example: If you are interested in quarter Q053, you would restrict the response rate to include only those respondents in the circled boxes below. Then you would determine the percentage of respondents that participated with the survey.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

3) Total Survey:

Objective: The % of households that participate with the survey regardless of their length of time in the survey.

Formula:

$$\text{TPOPS (RR4)} = \frac{I}{(I + NC + R + e(\text{UN}))} \times \text{All Respondents}$$

Example: If you are interested in quarter Q053, you would restrict the response rate to include all groups of respondents or those respondents in the circled boxes below. Then you would determine the percentage of respondents that participated with the survey.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

2. 3 Example of Current Results*

TPOPS Response Rate Results for the Last 4 Years			
Quarter	Initial Data Collection (Call 1 Only)	Update Collection (Calls 2, 3, 4 Only)	Total Survey (All Calls)
022	52.82%	64.09%	60.21%
023	55.80%	66.18%	62.75%
024	55.64%	65.59%	62.33%
031	54.73%	65.72%	62.03%
032	54.99%	64.13%	61.13%
033	53.29%	64.39%	60.97%
034	53.13%	64.56%	60.92%
041	50.65%	62.72%	58.65%
042	42.33%	52.06%	48.57%
043	47.79%	58.48%	54.48%
044	49.52%	61.92%	57.25%
051	49.57%	60.40%	56.30%
052	48.97%	59.21%	55.53%
053	48.97%	59.22%	55.84%
054	47.00%	53.74%	51.54%
061	44.84%	49.69%	48.17%

*Note the results shown here are not final for several issues. Most of these issues are still being investigated.

3. The Projected TPOP Response Rates

Recently, OPLC and the Price and Statistical Methods Division (PSMD) decided to revisit the issue of response rates and to determine the following:

- 1) Whether or not the current rates meet BLS standards
- 2) Which OPLC programs calculate all standard rates
- 3) Whether or not any other response rates should be created

During this review process, it was decided this would be a good time to revamp the entire TPOPS response rate system. This decision was made for the following two reasons:

- 1) Current three rates provide incomplete information about all types of respondents
- 2) Program wanted more response rates especially in the area of respondent participation over time

Consequently, the response rate team has currently decided to create 8 new groups or collections of response rates. Overall, these 8 groups of response rates belong to one of two schemas. The first scheme is Quarter First in Sample (QFS); while, the second scheme is Current Quarter of Collection (QTR).

3. 1 Difference Between QFS & QTR

QFS or Quarter First in Sample Scheme

Objective: Determine how well a group of respondents is doing to date.

Reason for Existence: Track respondent participation over time.

Reason behind Name Quarter First in Sample: The response rates for a given quarter will be calculated using all information for a group of respondents. This means using information from the current quarter and all previous quarters. Another way to look at it would be to use all information from the first quarter to the current quarter.

Example of QFS: Say we are interested in reporting response rates for quarter Q053. We would report response rates on each group of respondents (i.e. the rows) using all information available up to Q053 or see table below:

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

QTR or Current Quarter of Collection Scheme

Objective: Provide current quarter estimates for all respondents grouping all respondents together.

Reason for Existence: To provide overall estimates of how well the survey is doing.

Reason behind Name Current Quarter of Collection: The response rates for a given quarter will be calculated using this quarter of information only. Note, this is not always true. In times of exception, the current quarter of information will be compared to previous quarters. Therefore, it is still the current quarter of information that is most important.

Example of QFS: Say we are interested in the quarter Q053. We would report response rates using all information obtained in quarter Q053 (i.e. the column) or see table below:

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

Notice this method will group all respondents together.

3.2 QFS Initial Data Collection

Objective: Determine the % of unique households which have participated with the survey at least 1 time.

Number of Rates: 4 (One for each group of Respondents).

Example: 1 rate for each group of respondents occurring in Q053. These groups of respondents are: Q044, Q051, Q052, and Q053.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

3.3 QFS Update Collection Response Rates

Objective: Determine how well respondents continue to participate in the survey given they participated in any previous quarter.

Number of Rates: 3 (One for each group of respondents with a previous quarter).

Example: 1 rate for each group of respondents occurring in Q053 and also has a previous quarter (i.e. Q044, Q051, and Q052). Notice we compare information obtained in Q053 for each group of respondents (the boxes) to their previous quarters of information (the circles).

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

3.4 QFS Retention Rate

Objective: Determine how well respondents continue to participate in the survey given they participated during their 1st quarter in sample.

Number of Rates: 3 (One for each group of respondents with a previous quarter).

Example: 1 rate for each group of respondents occurring in Q053 and also has a previous quarter (i.e. Q044, Q051, and Q052). Notice we compare information obtained in Q053 for each group of respondents (the boxes) to their quarter 1 group of information (the circles).

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

3.5 QFS Interview Frequencies

Objective: Determine % of eligible households responding X amount of times.

Number of Rates: 14 (One for each combination of group of respondents and their number of successful interviews).

Example: Suppose you are interested in the group of respondents that have been in the survey for two quarters (i.e. row 2nd quarter below). Each respondent within the 2nd quarter group of respondents will have faced two opportunities to participate with the survey.

As a result, each respondent will have the following possible outcomes: no successful interviews, one successful interview, or two successful interviews. Third and fourth successive interviews are not applicable because the respondent has not been in the survey long enough. A more complete list of outcomes is in the table below.

Length of Time in Sample	Households With At Least X Successful Interviews				
	None	1	2	3	4
4 th quarter	J	K	L	M	N
3 rd quarter	F	G	H	I	n/a
2 nd quarter	C	D	E	n/a	n/a
1 st quarter	A	B	n/a	n/a	n/a

3. 6 QTR Initial Response Rate

Objective: Determine the % of respondents providing information for the first-time during the current quarter. Note a given respondent does not have to be in their first quarter to qualify.

Number of Rates: 1.

Example: Say we are interested in the quarter Q053. Then we want the number of respondents in Q053 that provided us with information for their very first-time. Regardless of how long they have been in the sample previously.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

No Successful Interviews

First-Time Successful Interviews

3. 7 QTR Update Collection Response Rate

Objective: Determine the % of people continuing to participate with the survey during the current quarter given they participated in a previous quarter.

Number of Rates: 1.

Example: Say we are interested in the quarter Q053. Then we want the number of respondents in Q053 that provided us with information. However, we will

restrict the response rates to those respondents that provided us with information in a previous quarter.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

Had a Successful Interview

Has a Successful Interview

3. 8 QTR Total Survey Response Rate

Objective: Determine the % of households participating with the survey out of all eligible households during the current quarter.

Number of Rates: 1. Note this response rate is the same as the current method for calculating the Total Survey response rate.

Example: Say we are interested in the quarter Q053. For this response rate, we want the number of eligible people who participated with the survey in Q053 only. No other quarter of information is necessary.

Quarter Respondent Start	Respondent Duration				
	Q044	Q051	Q052	Q053	Q054
Q044	1	2	3	4	
Q051		1	2	3	4
Q052			1	2	3
Q053				1	2
Q054					1

3. 9 QTR Other Response Rates

3 Objectives:

1) Contact: Determine % of households were the respondent was reached regardless of whether or not they were cooperative or uncooperative.

2) Cooperation: Determine % of households that were cooperative given that we were able to reach the respondent.

3) Refusal: Determine % of eligible households that refuse to participate with the survey.

Number of Rates: 3 (One for each objective).

Examples (Table is same as section 3.8):

1) Contact: In a given quarter, suppose the survey calls 50 households. Of those 50 households, 30 households answer the phone. The response rate would be 30 households answered out of 50 households.

2) Cooperation: Continuing the Contact example, let us further say 15 households participated and 15 households said politely “No, thank you.” The response rate would be 15 households cooperated out of 30 households that answered.

3) Refusal: In a given quarter, this response rate is simply the number of respondents that refused to participate out of all eligible households (not just those who answered).

4. Conclusion

Recently, OPLC decided to revisit the issue of response rates and asked each of its surveys to determine whether or not they were in compliance with BLS standards and whether or not any new response rates should be created.

During this review, the response rate team concluded the following about the current TPOPS response rates:

- 1) Satisfy BLS standards where applicable
- 2) Provide incomplete information (especially pertaining to how group of respondents perform over time)

As a result of finding 2, TPOPS took this opportunity to revamp its entire response rate system. The first wave of results will produce 30 response rates divided into 2 major schemas, Quarter First in Sample and Current Quarter of Collection, and 8 groups (4 in each scheme).

References

¹ Ferguson, Cohen, and Rosen, “Survey Response Measurement at the Bureau of Labor Statistics” in *Joint Statistical Meetings Section on Survey Research Methods*, 2003 pg 1446– 1452.

² See website <http://www.aapor.org/>.