Assessing the Impact of Interview Mode on Data Quality and Survey Estimates in the Medical Expenditure Panel Survey (MEPS)

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ABSTRACT

A study by Simile, Stussman, and Dahlhamer (2006) indicated that interview mode has some effect on estimates of health indicators in the National Health Interview Survey (NHIS). The Medical Expenditure Panel survey (MEPS), like the NHIS, uses both face-to-face (FF) and phone (P) modes of interview administration to increase response rates and decrease survey costs. Therefore, we are interested in assessing the effect of the modes of interview on health estimates in the MEPS.

The purpose of this paper is to describe the demographic, socioeconomic, and geographic characteristics of MEPS interviews conducted FF versus by P. We also examine key paradata measures for the two modes of interview groups. To assess data quality, we examine item missing rates for selected survey variables. Finally, we compare selected survey estimates by mode of interview. We also run regression models on selected survey variables using covariates.

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1. Introduction

The Medical Expenditure Panel Survey (MEPS) is a complex national probability sample survey sponsored by the Agency for Healthcare Research and Quality (AHRQ). The MEPS sample is drawn from households that participated in the previous year's National Health Interview Survey (NHIS), conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention. The MEPS is designed to provide nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage for the U.S. civilian noninstitutionalized population. Each new MEPS sample is referred to as a panel and data for each panel are collected through a series of five rounds of computer-assisted personal interviews (CAPI) that yield annual data for each of two consecutive calendar years. Details of the MEPS sample design can be found at

http://www.meps.ahrq.gov/mepsweb/data_files/publications/mr22/mr22.pdf

A study by Simile, Stussman, and Dahlhamer (2006) indicated that interview mode has some effect on estimates of health indicators in the NHIS. The MEPS, like the NHIS, uses both face-to-face (FF) and phone (P) modes of interview administration to increase response rates and decrease survey costs. In MEPS, a P interview is accepted when all attempts for a FF interview have been exhausted. In addition, most interviews of college students are conducted by P and a P interview is also conducted when a Reporting Unit (RU) (definition of RU is given in section 2 below) has moved to an area that is not near a MEPS PSU, thus making a FF interview prohibitively expensive.

The purpose of this paper is to describe the demographic, socioeconomic, and geographic characteristics of MEPS interviews conducted FF versus by P. We also examine key paradata

measures for the two modes of interview groups. To assess data quality, we examine item missing rates for selected survey variables. Finally, we compare selected survey estimates by mode of interview. We also run regression models on selected survey variables using covariates that are considered predictors plus interview mode to assess if interview mode remains significant when other predictors are included.

In this study, we use the 2007 MEPS first half of year, or point-in-time (PIT), file which includes data from the 2007 portion of Panel 11, Round 3 and from Round 1 of Panel 12. We also analyze 2007 full year data, which include information from the second year of Panel 11 and the first year of Panel 12.

2. Data Analysis and Observations

The primary unit of analysis in this study is the reporting unit (RU). A MEPS RU is defined as an individual person or a group of persons in a sampled household who are related by blood, marriage, adoption, or other familial association. Regardless of the legal status of their relationship, two persons living together are treated in MEPS as a single RU if they choose to be identified as a family unit. Most households contain a single family or a single individual, although this is not always the case. Examples of households that may be of the more unusual variety include: a single RU consisting of married daughter and her husband living in the same house with her parents; two unrelated persons living in the same apartment who consider themselves as two independent entities represent two distinct RUs; and a pair of unmarried people living in a condominium who characterize themselves as a single family are treated as a single RU.

2.1 Percent of RUs by interview type: FF versus P

For interviews conducted during the first half of 2007, approximately 6 and a half percent were conducted by P and 93 and a half percent were administered via FF interviews (The weighted percents were 7 and a half percent conducted by P and 92 and a half percent administered via FF):

Table A. Percentage of completed interviews (reporting unit (RU) level) by mode of interview

Unweighted:

2007	Face-to-Face interview	Phone interview
Panel 11 (n=6776)	93.4	6.6
Panel 12 (n=5795)	93.4	6.6
Combined Panels	93.4	6.6

Source of data: 2007 MEPS point-in-time file.

Weighted:

2007	Face-to-Face interview	Phone interview
Panel 11	92.4	7.6
Panel 12	92.8	7.2
Combined Panels	92.6	7.4

Source of data: 2007 MEPS point-in-time file.

2.2 Bivariate profile of RUs by interview mode

We first examine demographic, geographic, and employment status of the RU reference person according to whether the RU interview was conducted FF or by P. We also examine selected administrative data (paradata) associated with the interview, e.g., ever refused the interview.

Tables 1 and 2 provide a summary of the following 14 characteristics of RUs by interview mode:

1. Age of the reference person

2. Education of the reference person

3. Sex of the reference person

4. Race/ethnicity of the reference person

5. Marital status of the reference person

6. Size of the RU

7. Employment status of the reference person

8. Region

9. MSA (Metropolitan Statistical area) status

10. Poverty status

11. Break off at any time during the interview

12. Number of contacts

13. Ever refused the interview

14. Mean interview time

Table 1 shows the weighted distribution (column percent) of selected demographic, geographic, and interview characteristics stratified by interview mode. Table 2 shows the percent of RUs with interviews conducted FF versus by P (i.e., row percent) by the same characteristics as in Table 1.

For 13 of the 14 characteristics examined, the distribution differed by interview mode; only the mean interview time was not significant at alpha=0.01 level.

RUs whose interview was conducted by P, as compared to RUs with a FF interview, were more likely (i.e., with higher percent as given in tables 1 and 2) to have the following characteristics (person level characteristics are those of the reference person of the RU):

1. Younger: <65 of age

2. Higher education level

3. Male

4. Non-minority

5. Never married

6. Reside in single person household

7. Employed

8. Reside in the northeast

9. Reside in MSA

10. Higher income

11. More break offs during interview

12. More contacts

13. Higher ever refused rate

2.3 Evaluation of factors associated with FF interview vs. P interview

We carried out a logistic regression analysis to assess significant predictors of interview mode. Table 3 provides results of the logistic regression with interview mode as the dependent variable and the 14 demographic, geographic, and paradata variables as predictors. Among the 14 potential covariates, the following six: race/ethnicity, marital status, RU size, region, number of contacts, and ever refused were significant at Alpha=0.01 level.

2.4 Item nonresponse rates by interview mode

We next examined item missing rates for selected survey variables. This analysis was based on the 2007 full year data. Table 4 shows the level of item nonresponse, based on the reference person of the RU, for 14 selected variables by the two modes of interview. While the item nonresponse rates overall are relatively low (except for How long since last PSA), for eight of the 14 variables, the item nonresponse rate was higher ($p < .01$) for P interviews as compared to FF interviews. The prevention type measures had the highest item nonresponse rates, and for each, the missing rate was higher among the interviews administered via P relative to those administered via a FF interview.

2.5 Comparison of selected survey measures by mode of interview

We calculated estimates according to the two modes of interview as well as from the full sample for the following 10 survey measures:

- Any activity limitation: percent of RUs with at least one member with any activity limitation.

- High cholesterol: percent of RUs with at least one member with high cholesterol.

- RX: percent of RUs with at least one member who has prescription drugs.

- Office based provider visits

- Emergency room visits

- Number of inpatient nights in hospital

- Number of outpatient department visits

- Health status

- Insurance coverage

- Mean health care expenditures: in dollar amount

Table 5.1 shows weighted survey estimates according to the two modes of interview. Eight of the ten measures have at least one category that is significantly different, while health status and mean expenditures did not show a significant difference by mode of interview. The percent of persons with any activity limitation, high cholesterol (aged 17+), and with a prescription (including refill) was significantly higher among the interviews conducted via FF compared to a P interview. However, for the four health care utilization measures (office based provider visits, emergency room visits, inpatient stays, and outpatient visits), the percent at the upper range for each of these measures is notably higher among the interviews administered via P compared to the FF interview. There was no significant difference in uninsured rates (<65 years) among the two modes of interview; however, the any private rate was higher among the P group, while the public only coverage was lower among the P group.

Table 5.2 shows estimates from the full sample and the FF interview group. Only 1 estimate was significantly higher (alpha < .05) for the full sample compared to the FF group: 6+ inpatient stays.

2.6 Impact of interview mode on survey measures controlling for other factors

The previous section (section 2.5) showed that estimates from the two groups of interview modes were significantly different for 8 of the 10 selected survey measures. We further assessed whether the differences were due to difference in interview mode or could be accounted for by other factors. We fit two regression models for each of 5 RU level survey measures: insurance coverage, any activity limitation, high cholesterol, prescription drugs, and mean expenditures. One model used the 14 variables used in the bivariate profiling as

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predictors; the other used the 14 variables plus interview mode as predictors. The results of those regression runs are given in table 6.

Interview mode was not a significant predictor for mean expenditures, which is consistent with the result in the last section. Two survey measures, namely, high cholesterol and prescription drugs, have interview mode as a significant predictor at Alpha=0.05 level. However, at Alpha=0.01 level, interview mode is only significant for high cholesterol.

Overall, including interview mode in the models as a predictor does not have much impact on the level of significance of the other predictors.

3. Summary/Discussion

Approximately 6.6 percent of the interviews in the first half of 2007, accounting for about 7.5 percent of the weighted population of RUs, were administered by phone. The two modes of interview groups differed significantly on 13 demographic, socioeconomic, geographic, and survey administration characteristics. The phone interview group had higher item nonresponse rates for selected survey measures, in particular for prevention type measures. There were some significant differences in survey estimates based on interview mode, and the effect of interview mode on the estimation of at least one survey measure was not totally eliminated after controlling for other factors.

Overall, the percent of RUs interviewed by phone in MEPS is relatively small compared to that of the NHIS. It was as high as 27% for the 2005 NHIS sample adult section of the questionnaire (Simile, Stussman, and Dahlhamer, 2006). Therefore, the impact of interview mode in MEPS may not be as serious as in NHIS, as shown by the lack of significance between

estimates from the full sample and from the FF interview group in MEPS. Also, as shown in table 6, when controlling for other factors, interview mode was significant (Alpha=0.01 level) for only one out of 5 measures examined. Nevertheless, the percent of interviews conducted by phone should continue to be monitored as well as comparison of data quality across the two modes of interviews.

Reference

Catherine M. Simile, Barbara Stussman, and James M. Dahlhamer, "Exploring the Impact of Mode on Key Health Estimates in the National Health Interview Survey", <u>Proceedings of Canada Symposium 2006</u>, Methodological Issues in Measuring Population Health.

Table 1.Bivariate analysis of RU/reference person characteristics by interview mode
      MEPS 2007 PIT. (Column %)

| Characteristic | Overall (%) | Interview mode | |
		Face-to-Face (%)	Phone (%)
Age of reference person*			
<19	0.4	0.4	1.1
19 - 24	7.9	7.2	16.6
25 - 39	27.9	27.6	31.7
40 - 64	44.8	45.3	38.6
65+	19.0	19.5	12.1
Education*			
< 8years	4.5	4.6	3.6
9 - 12 years (high school)	41.0	41.5	35.1
13 - 16 years (college)	43.4	42.9	49.2
16+ years	11.1	11.0	12.1
Sex*			
male	48.2	48.1	50.2
Race/ethnicity*			
Hispanic	12.0	12.1	11.0
Non-Hispanic Black	11.8	12.1	8.8
Non-Hispanic Asian	3.9	3.9	3.7
Non-Hispanic Other	72.2	71.9	76.6
Marital status*			
Married	44.5	45.1	36.1
Widowed/separated/divorced	25.2	25.5	21.0
Never married	24.6	23.5	37.8
Other	5.8	5.8	5.1
Size of RU*			
1	35.0	34.0	46.9
2	30.9	31.5	24.2
3	14.0	14.3	11.1
4	11.9	11.9	10.8
5+	8.3	8.4	7.0
Employment status*			
Employed	65.6	65.2	71.5
Region*			
Northeast	18.3	17.9	22.9
Midwest	22.8	23.1	19.3
South	36.2	36.5	31.9
West	22.7	22.5	25.9
MSA status*			
MSA	83.3	83.1	86.3
Non MSA	16.7	16.9	13.7

Table 1. (Cont.)

Characteristic	Overall (%)	Interview mode	
		Face-to-Face (%)	Phone (%)
Poverty status*			
Poor	12.9	13.0	11.7
Near poor	4.8	5.0	2.8
Low income	14.4	14.7	11.5
Middle income	31.4	31.3	32.6
High income	36.5	36.1	41.4
Break off*			
0 time	91.4	91.7	87.7
1 or 2 times	8.0	7.8	10.8
3+ times	0.6	0.5	1.5
Number of contacts*			
1 time	8.8	9.1	5.1
2 or 3 times	34.9	36.5	14.6
4 or 5 times	20.4	20.9	14.1
6 - 10 times	20.4	19.7	28.6
11 - 14 times	6.0	5.4	12.7
14+ times	7.0	5.6	24.3
Ever refused*			
Yes	5.0	4.0	17.5
Mean interview time	108.8	108.7	109.6

* Significant at Alpha = 0.01

Table 2. Bivariate analysis of RU/reference person characteristics by interview mode
        MEPS 2007 PIT. (Row %)

Characteristic	Interview mode	
	Face-to-Face (%)	Phone (%)
Overall (%) --->	92.59	7.41
Age of reference person*		
<19	80.4	19.6
19 - 24	84.5	15.5
25 - 39	91.6	8.4
40 - 64	93.6	6.4
65+	95.3	4.7
Education*		
< 8years	94.0	6.0
9 - 12 years (high school)	93.6	6.4
13 - 16 years (college)	91.5	8.5
16+ years	91.8	8.2
Sex*		
male	92.3	7.7
female	92.9	7.1
Race/ethnicity*		
Hispanic	93.3	6.7
Non-Hispanic Black	94.5	5.5
Non-Hispanic Asian	92.9	7.1
Non-Hispanic Other	92.2	7.9
Marital status*		
Married	94.0	6.0
Widowed/separated/divorced	93.8	6.2
Never married	88.6	11.4
Other	93.5	6.5
Size of RU*		
1	90.1	9.9
2	94.2	5.8
3	94.1	5.9
4	93.3	6.7
5+	93.7	6.3
Employment status*		
Employed	91.9	8.1
Other	93.9	6.2
Region*		
Northeast	90.7	9.3
Midwest	93.7	6.3
South	93.5	6.5
West	91.6	8.4
MSA status*		
MSA	92.3	7.7
Non MSA	93.9	6.1

Table 2. (Cont.)

Characteristic	Interview mode	
	Face-to-Face (%)	Phone (%)
Poverty status*		
Poor	93.7	6.3
Near poor	96.0	4.1
Low income	94.5	5.5
Middle income	92.8	7.2
High income	92.2	7.9
Break off*		
0 time	92.9	7.1
1 or 2 times	90.0	10.0
3+ times	81.6	18.5
Number of contacts*		
1 time	95.7	4.3
2 or 3 times	96.9	3.1
4 or 5 times	94.9	5.1
6 - 10 times	89.6	10.4
11 - 14 times	84.2	15.8
14+ times	74.4	25.7
Ever refused*		
Yes	74.1	26.0
No	93.6	6.4
Mean interview time		
	N/A	N/A

* Significant at Alpha = 0.01

Table 3. Logistic regression analysis of variables related to interview mode (Face-to-face vs. Phone)
at RU (reference person) level

Effect	DF	Wald Chi-Square	Pr > Chi-Square
age	1	1.8	0.1794
education	3	4.7	0.1972
sex	1	0.8	0.3607
race/ethnicity	3	25.9	<.0001
marital status	3	31.9	<.0001
RU size	4	27.7	<.0001
employment status	1	2	0.1582
region	3	20.3	0.0001
MSA	1	0.0012	0.972
poverty status	4	13	0.0113
break off	2	8.5	0.0144
number of true contacts	6	328.1	<.0001
ever refused	1	75.9	<.0001
interview time	1	4.8	0.0279

Source of Data: MEPS 2007 Point-in-time (PIT)

Note: Dependent variable is interview mode with
1=face-to-face, 2=phone.

Table 4. Percent item nonresponse by interview mode – based on reference person of RU

Variable	Face-to face (%)	Phone (%)	Significance
Education*	0.58	1.37	0.0089
High blood pressure (>17)	0.32	0.7	0.0943
High cholesterol (>17)*	0.64	1.81	0.0003
Diabetes diagnosis	0.21	0.56	0.0608
How often dental check up	0.6	0.98	0.2156
How long last routine checkup (>17)*	1.79	3.51	0.0012
How long last flu shot (>17)*	1.38	3.79	<.0001
How long since mammogram (>29, F)*	2.03	4.84	0.0014
How long since last PSA (>39, M)*	6.77	13.79	0.0004
Usual source of care*	0.55	1.82	<.0001
Employment status*	0.29	1.15	<.0001
Mental health status	0.02	0	0.7179
Health status	0.02	0	0.7179
Any activity limitation	0.31	0.55	0.263

*p<0.01
Data source: 2007 MEPS full year data.

Table 5.1. Comparison of estimate of percent/mean of selected survey measure by interview mode

| Survey measures | Interview mode | | | | t statistic of the difference between modes |
| | Face-to-face | | Phone | | |
	Estimate	(Standard Error)	Estimate	(Standard Error)	
Any activity limitation	15.56	(0.39)	10.35	(1.12)	*4.37
High cholesterol (>17)	41.04	(0.55)	28.69	(1.96)	*6.07
RX (including refill)	84.83	(0.42)	77.87	(1.84)	*3.68
Office based provider visits					
none	30.15	(0.31)	30.84	(1.24)	0.54
1 to 4 times	41.01	(0.34)	37.45	(1.30)	*2.66
5 to 8 times	10.92	(0.22)	7.80	(0.70)	*4.24
more than 8 times	17.92	(0.27)	23.91	(1.14)	*5.10
Emergency room visits					
none	79.21	(0.28)	72.33	(1.19)	*5.63
1 time	9.37	(0.20)	7.76	(0.69)	*2.24
More than 2 times	11.42	(0.22)	19.91	(1.07)	*7.77
Number of inpatient nights in hospital					
none	84.69	(0.25)	76.59	(1.12)	*7.04
1 to 5	4.70	(0.15)	4.20	(0.52)	0.93
6 or more	10.61	(0.21)	19.21	(1.05)	*8.03
Number of outpatient dept visits					
none	77.16	(0.29)	74.08	(1.17)	2.55
1 or 2 times	10.81	(0.22)	6.62	(0.66)	*6.06
3 or more times	12.03	(0.23)	19.29	(1.06)	*6.70
Health status					
Excellent or very good	64.31	(0.34)	66.52	(1.41)	1.52
Good or fair	33.18	(0.34)	30.90	(1.39)	1.60
Poor	2.52	(0.11)	2.58	(0.42)	0.14
Insurance coverage (age<65)					
Any private	66.69	(0.33)	71.80	(1.31)	*3.77
Public only	21.03	(0.28)	14.31	(0.97)	*6.66
Uninsured	13.28	(0.24)	13.89	(1.05)	0.57
Mean health care expenditures	$4,739.90	(101.10)	$4,229.30	(528.70)	0.95

* Significant at Alpha=0.01: t > 2.57.   Data source: 2007 MEPS full year data.

Table 5.2. Comparison of estimate of percent/mean of selected survey measures between full sample and face-to-face interview

Survey measures	Full sample		Interview mode Face-to-face		t statistics of the difference between full sample and face-to-face interview
	Estimate	(Standard Error)	Estimate	(Standard Error)	
Any activity limitation	15.2	(0.37)	15.56	(0.39)	0.66
High cholesterol (>17)	40.19	(0.54)	41.04	(0.55)	1.10
RX (including refill)	84.34	(0.41)	84.83	(0.42)	0.83
Office based provider visits					
none	30.2	(0.30)	30.15	(0.31)	0.11
1 to 4 times	40.75	(0.33)	41.01	(0.34)	0.55
5 to 8 times	10.7	(0.21)	10.92	(0.22)	0.73
more than 8 times	18.34	(0.26)	17.92	(0.27)	1.12
Emergency room visits					
none	78.72	(0.27)	79.21	(0.28)	1.25
1 time	9.26	(0.19)	9.37	(0.20)	0.40
More than 2 times	12.02	(0.22)	11.42	(0.22)	1.94
Number of inpatient nights in hospital					
none	84.12	(0.25)	84.69	(0.25)	1.62
1 to 5	4.67	(0.14)	4.70	(0.15)	0.14
6 or more	11.22	(0.21)	10.61	(0.21)	2.03
Number of outpatient dept visits					
none	76.94	(0.28)	77.16	(0.29)	0.54
1 or 2 times	10.51	(0.21)	10.81	(0.22)	1.00
3 or more times	12.55	(0.22)	12.03	(0.23)	1.64
Health status					
Excellent or very good	64.46	(0.33)	64.31	(0.34)	0.29
Good or fair	33.04	(0.33)	33.18	(0.34)	0.31
Poor	2.51	(0.11)	2.52	(0.11)	0.09
Insurance coverage (age<65)					
Any private	66.08	(0.32)	66.69	(0.33)	1.31
Public only	20.60	(0.27)	21.03	(0.28)	1.13
Uninsured	13.32	(0.23)	13.28	(0.24)	0.12
Mean expenditure	$4,704.10	(100.50)	$4,739.90	(101.10)	0.25

*Significant at Alpha=0.01: t > 2.57. Data source: 2007 MEPS full year data.

Table 6: Logistic/regular regression analysis of RU level survey measures with and without interview mode (INTVTYPE) as a predictor

Effect	Insurance coverage Pr > Chi-Square With INTVTYPE	Without INTVTYPE	Activity limitation Pr > Chi-Square With INTVTYPE	Without INTVTYPE	High cholesterol Pr > Chi-Square With INTVTYPE	Without INTVTYPE	Rx including refill Pr > Chi-Square With INTVTYPE	Without INTVTYPE	Mean expenditure Pr > Chi-Square With INTVTYPE	Without INTVTYPE
age	<.0001	<.0001	0.0002	0.0002	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
education	<.0001	<.0001	<.0001	<.0001	0.0006	0.0006	0.543	0.5679	0.4133	0.4098
sex	<.0001	<.0001	0.0241	0.024	0.9956	0.9773	<.0001	<.0001	0.829	0.8296
race/ethnicity	<.0001	<.0001	<.0001	<.0001	0.0006	0.0008	<.0001	<.0001	0.0016	0.0015
marital status	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
RU size	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
employment status	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
region	<.0001	<.0001	0.4556	0.4609	0.0054	0.0077	0.0042	0.0044	0.1014	0.1011
MSA	0.9889	0.9901	0.409	0.4034	0.2923	0.293	0.6923	0.7084	0.0438	0.0435
poverty status	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.046	0.0567	0.0843	0.0861
break off	0.3396	0.3194	0.0585	0.0548	0.0052	0.0038	<.0001	<.0001	<.0001	<.0001
number of true contact	0.203	0.142	0.1716	0.1268	0.0006	<.0001	0.0428	0.0203	0.0568	0.0442
refusal	0.9365	0.9816	0.6272	0.5162	0.0058	0.0172	0.3495	0.2582	0.1729	0.1876
interview time	0.0041	0.004	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
interview mode	0.2443		0.1123		0.0013		0.0441		0.6328	

Data source: 2007 MEPS full year data.