Event Reporting in the Medical Expenditure Panel Survey (MEPS) by Type[1]

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Abstract

MEPS is a nationally representative survey of U.S. civilian households. Respondents are asked about their medical conditions and insurance coverage as well as their healthcare utilization and expenses through five rounds of interviews covering a two-year period. Annual estimates for the U.S. noninstitutionalized population are made by combining the data from the panel in its first year with the one in its second. This research examines the level of reporting of medical events by type (e.g., visits to office-based medical providers, hospital outpatient clinics, emergency departments, inpatient stays, dental visits, and prescription drug purchases) between the two years and five rounds of the survey. An assessment of the impact of round specific event reporting differentials is made on the annual MEPS utilization and expenditure estimates using simulation methods.

Key Words: survey quality, response accuracy, panel survey, simulation

1. Introduction and Background

Medical utilization and expenditures are an increasingly important public health policy issue in the United States. The Medical Expenditure Panel Survey (MEPS) can be used to estimate medical utilization and expenses for the U.S. civilian non-institutionalized population. Figure 1 shows the MEPS panel and round design. Each year since 1996, a new panel of households has been selected from the participants in the prior year's National Health Interview Survey (NHIS), an annual national probability survey

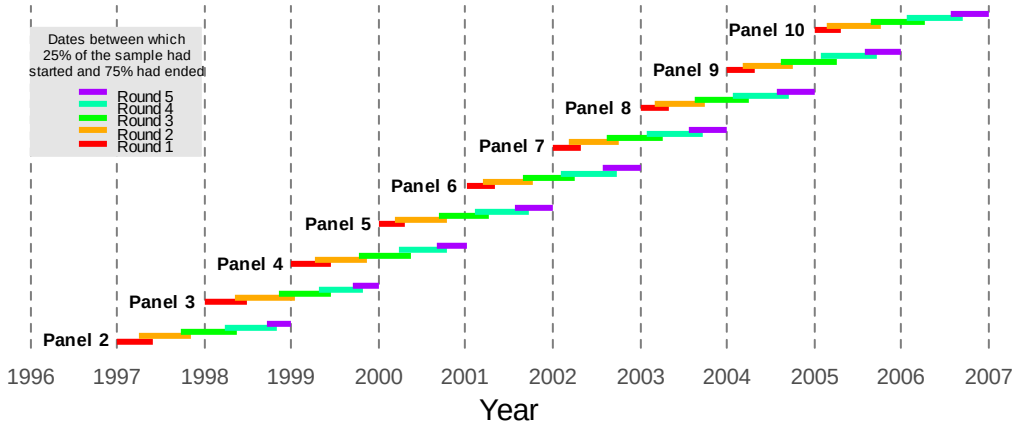

Figure 1 MEPS panel and round design

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conducted by the National Center for Health Statistics. For instance, the 1997 (MEPS Panel 2) sample was selected from the 1996 NHIS respondents, and the 1998 (MEPS Panel 3) sample was selected from the 1997 NHIS respondents.

MEPS respondents are interviewed up to five times (rounds) to collect information about their health care over a two-year period. As each NHIS sample is nationally representative, each MEPS panel is also nationally representative. National-level expenditure and utilization estimates can be produced using data from only one MEPS panel, and in 1996, that was the case. After 1996, however, MEPS national estimates have been produced from data pooled between the two panels in the field during the year. The 1998 estimates, for example, were derived from data pooled between the 2nd year data of Panel 2 and the 1st year data of Panel 3. This design has the advantage of increasing the sample sizes for the annual estimates; however, it has the potential of introducing other sources of error. Previous research has shown that respondents generally report fewer events in the 2nd year of the survey. In any single year, the difference between 1st and 2nd year estimates is not statistically significant. Still, the pattern persisting year after year, panel after panel suggests the differences should be investigated.

MEPS' expenditure estimates are periodically benchmarked against other data sources. After backing out legitimate differences, MEPS 2002 national-level estimates of total healthcare expenditures were found to be lower than the comparable estimates produced from the National Healthcare Expenditure Accounts (NHEA, Bureau of Economic Analysis, US Department of Commerce) by about 14% (Sing et al, 2006). In the 2001-2003 time period, hospital and physician expenditures among MEPS respondents on Medicare were also found to be about 14% lower than the expenditures directly reported for these respondents by Medicare (Olin, et al, 2008; Zuvekas and Olin, 2008). Because the MEPS' expenditures come solely from the events that MEPS respondents report in the various rounds, these studies suggest MEPS respondents may not be reporting all their events.

This research examines type-specific event reporting by round of the MEPS. Figure 2 shows the per-person mean number of reported events per round day by MEPS panel and round for six MEPS event types: office-based medical provider visits, hospital outpatient department visits, hospital emergency department visits, dental visits, hospital inpatient stays and prescription drug purchases. As can be clearly seen, the rate of event reporting drops significantly for all these event types in every panel after the first round of the survey. An assessment of the impact of this differential event reporting rate after the first round is made by building a model to represent the event reporting rate by round and comparing the model prediction to the prediction when the effect of the rounds is removed.

2. Methods

Because the distribution of event reporting was highly skewed—the majority of respondents reported no events, many reported only a few events and very few reported many events—and the number of events reported by the same person across the different rounds was highly correlated, two separate models were used to represent event reporting for each event type. The first—a mixed-effects logistic regression model—predicted whether any events were reported; the second—a mixed-effects linear regression model—predicted the conditional mean [log-transformed] number of events per round

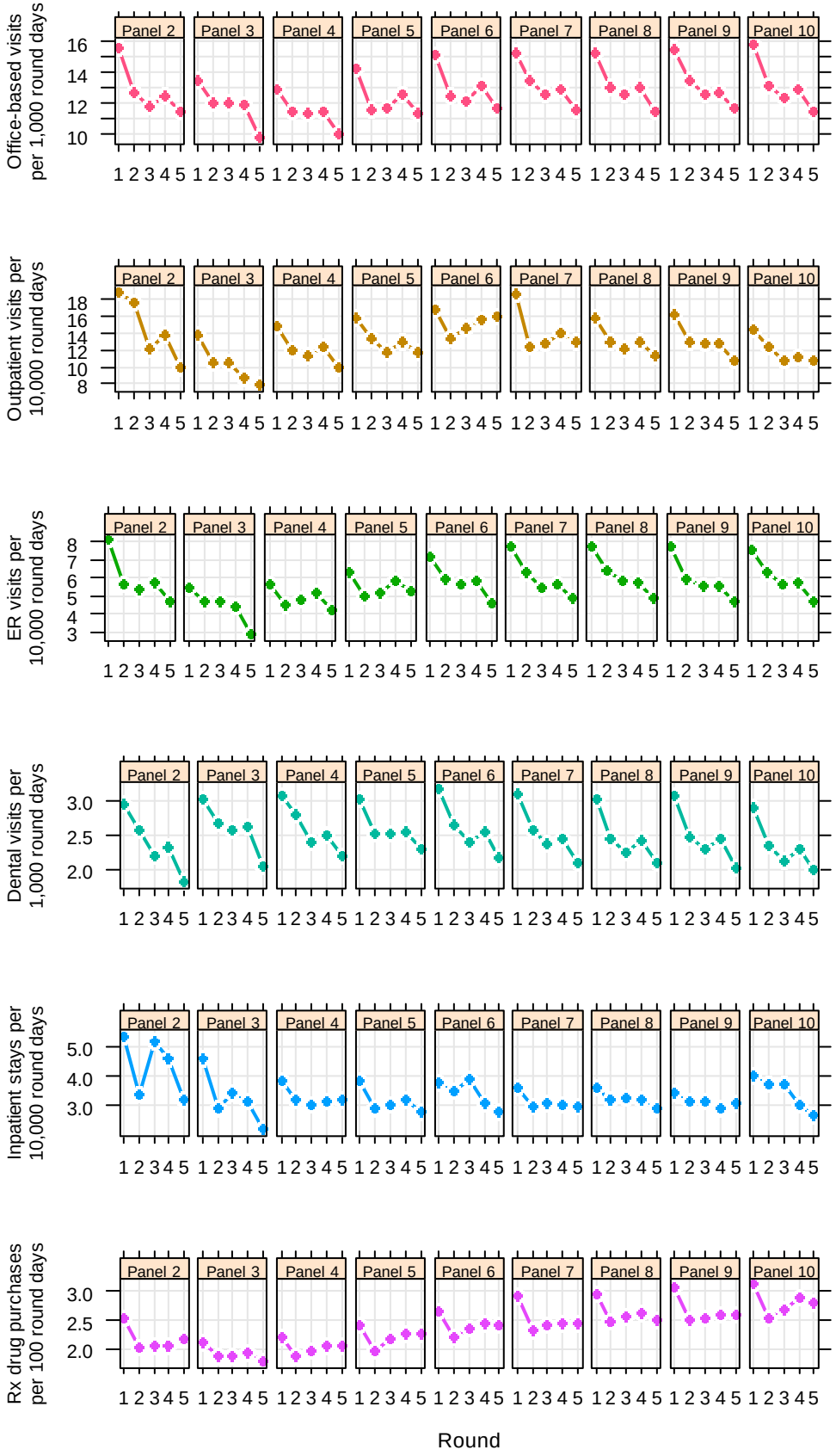

Figure 2 MEPS event reporting rates by panel and round

Table 1: Correlates of event reporting (office-based visits and Rx drug purchases only)

	Office-based visits		Rx drug purchases			Office-based visits		Rx drug purchases	
	pct any	cond mean	pct any	cond mean		pct any	cond mean	pct any	cond mean
Overall	47.3	3.8	43.9	7.8	**MSA**				
Panel					MSA	46.5	3.8	42.4	7.5
Panel 2	46.6	3.9	43.2	7.1	Non MSA	50.6	3.7	49.9	8.8
Panel 3	45.9	3.8	42.1	6.6	**Region**				
Panel 4	46.0	3.5	42.9	6.8	Northeast	51.7	4.0	45.2	7.7
Panel 5	47.5	3.6	44.5	7.1	Midwest	52.0	3.8	48.4	8.0
Panel 6	48.3	3.8	45.0	7.6	South	46.1	3.6	45.1	8.3
Panel 7	48.1	3.8	44.3	8.0	West	42.9	3.8	37.8	6.7
Panel 8	47.8	3.8	44.2	8.4	**Poverty**				
Panel 9	47.1	3.9	43.6	8.6	Below poverty	42.8	3.7	38.8	9.0
Panel 10	47.2	3.9	43.8	9.0	Near poverty	42.7	3.7	39.9	9.2
Round					Low income	42.4	3.6	39.3	8.5
Round 1	46.1	3.1	45.0	5.7	Middle income	46.5	3.7	42.9	7.5
Round 2	51.8	4.0	45.3	8.1	High income	54.3	4.0	51.1	7.0
Round 3	50.1	4.1	46.3	8.5	**Health status**				
Round 4	50.9	4.1	44.9	9.0	Fair-Poor	70.6	5.9	75.5	14.6
Round 5	37.4	3.5	37.6	7.7	Good-Excellent	44.2	3.3	39.6	6.0
Sex					**Insured**				
Male	40.8	3.5	37.4	7.1	Yes	52.2	3.9	48.3	8.0
Female	53.2	4.0	49.7	8.2	No	23.5	2.9	22.3	5.4
Age					**Number of Conditions**				
0 to 9	47.6	2.4	31.7	2.8	One or more	69.4	4.1	70.4	7.8
10 to 24	34.4	2.8	27.0	3.6	None	12.0	1.4	1.5	3.0
25 to 39	38.1	3.7	35.8	4.9	**Others in RU with Conditions**				
40 to 54	49.4	4.3	50.7	8.5	One or more	47.8	3.3	40.9	5.5
55 to 69	64.5	4.8	70.6	11.5	None	47.0	4.1	45.6	8.9
70 and older	76.9	5.0	82.2	13.3	**Interview time**				
Race/Ethnicity					1-29 minutes	18.4	2.2	20.3	5.4
Hispanic	36.0	3.1	30.5	6.1	30-89 minutes	40.7	3.0	38.5	6.9
Nonhipanic Black	40.8	3.3	38.4	8.4	90-119 minutes	56.8	4.0	51.1	7.9
Other	53.9	4.1	51.1	8.1	120-179 minutes	64.3	5.0	57.9	9.1
					180+ minutes	66.1	6.2	60.3	10.6

day, that is, the mean number of events per day among persons with at least one event in the round. Both of these models contained random effects for the survey respondent in order to account for the within-person correlation of reported events, and both contained the same set of fixed effects: MEPS survey round (5 levels), MEPS panel (9 levels), age category (6 levels), race/ethnicity (3 levels), Census region (4 levels), MSA location (2 levels), family poverty status (5 levels), self perceived health status (2 levels), whether the respondent had medical insurance, whether he/she reported any medical conditions as well as whether anybody else in the same responding unit reported any medical conditions, and the length of time for the interview (5 levels). The percent of respondents reporting any of these events—office-based visits and prescription drug purchases only—as well as the conditional mean number of events reported per round day are shown in Table 1 by these factors.

The final prediction for each person by round level record from this combined model was 0 if the probability of an event was 0 under the logistic model, else it was the back-transformed predicted number of events per round day under the linear model. An assessment of the fit of this combined model was made by comparing the mean of the model predicted event reporting rate to the mean of the actual event reporting rate (shown in Figure 2) for each event type by panel and round. This is shown in Figure 3 where the

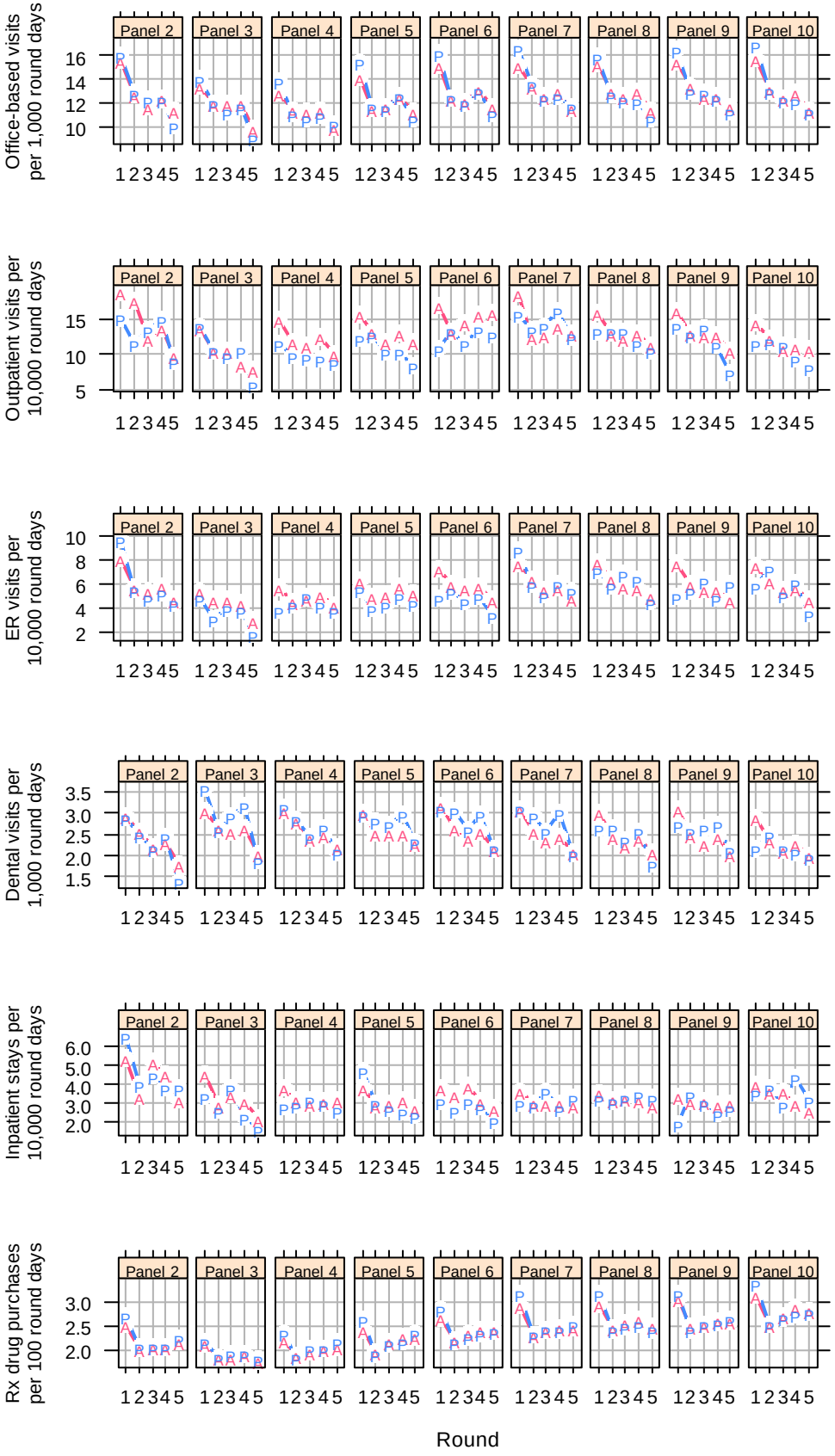

Figure 3 Actual vs. predicted event reporting rates by panel and round

lines labelled P are the model-predicted rate and the lines labelled A are the actual rates. The closer the lines are to each other, the better the fit.

The effect of differential event reporting after Round 1 was estimated by computing a simulated predicted rate under the model for each respondent whereby the effects of rounds 2, 3, 4 and 5 were removed from the prediction. This essentially kept the event reporting rate at Round 1 levels for each respondent while controlling for all the other covariates in the model [that are shown in Table 1]. Figure 4 displays the panel by round means for the simulated rates (lines labelled S) compared to that for the predicted rates (lines labelled P). The effect of differential reporting after Round 1 is evidenced by the simulated rate climbing higher than the predicted rate; the further apart, the greater the effect.

Person-level estimates of the annual total predicted and simulated events were made by multiplying the predicted and simulated rate per round day for each respondent by the number of days the person was in the round and then summing over all the rounds in the year. National estimates were obtained by taking the survey weighted sum across all persons in the year. Figure 5 shows the percent difference between the simulated and predicted national estimates.

3. Results

As can be seen in Table 1, the correlates of MEPS event reporting—as seen for the office-based visits and prescription drug purchases—varied considerably across socio-economic groups and survey administration categories. The percentage reporting at least one event and the conditional mean number of events reported was generally lower in the earlier panels and in Rounds 1 and 5. Males were less likely to report an event, and they reported fewer events when they did, compared to females. The percentage and conditional mean generally increased with age, except the percentage was also high among those age 0-9. Hispanics were the least likely to report events and conditionally reported the fewest among the three race/ethnicity categories. Persons living in the West were less likely to report any events, and they reported conditionally fewer prescription drug purchases; persons living in the South reported conditionally fewer office-based visits. The percent reporting any events and the conditional mean number generally increased with income, and those in fair-poor health and those with health insurance were more likely to report events than those in good-excellent health and those with no insurance, respectively. Respondents who reported having a medical condition were more likely to report events; however, those in units where another respondent reported having a medical condition were less likely to report any prescription drug purchases.

The results of the combined-model fits shown in Figure 3 suggest the combination of these two models did the best job predicting office-based visits and prescription drug purchases. In these charts, the average predicted rate of event reporting coincided well with the actual rate of event reporting in all rounds of all panels. The models worked generally well for the other event types with a few notable exceptions. For the hospital outpatient department visits, the model predictions were closer to the actual rates in the later panels than in the earlier ones. In Panel 6, for instance, the prediction at Round 1 was much lower than the actual rate. This would tend to lessen the impact of differential event reporting in the simulations. The model for emergency room visits predicted the actual rate well in Panels 2, 3, 5, 7 and 8; the Round 1 rate was underestimated for the other panels. The model for dental visits predicted well except perhaps for Panel 10,

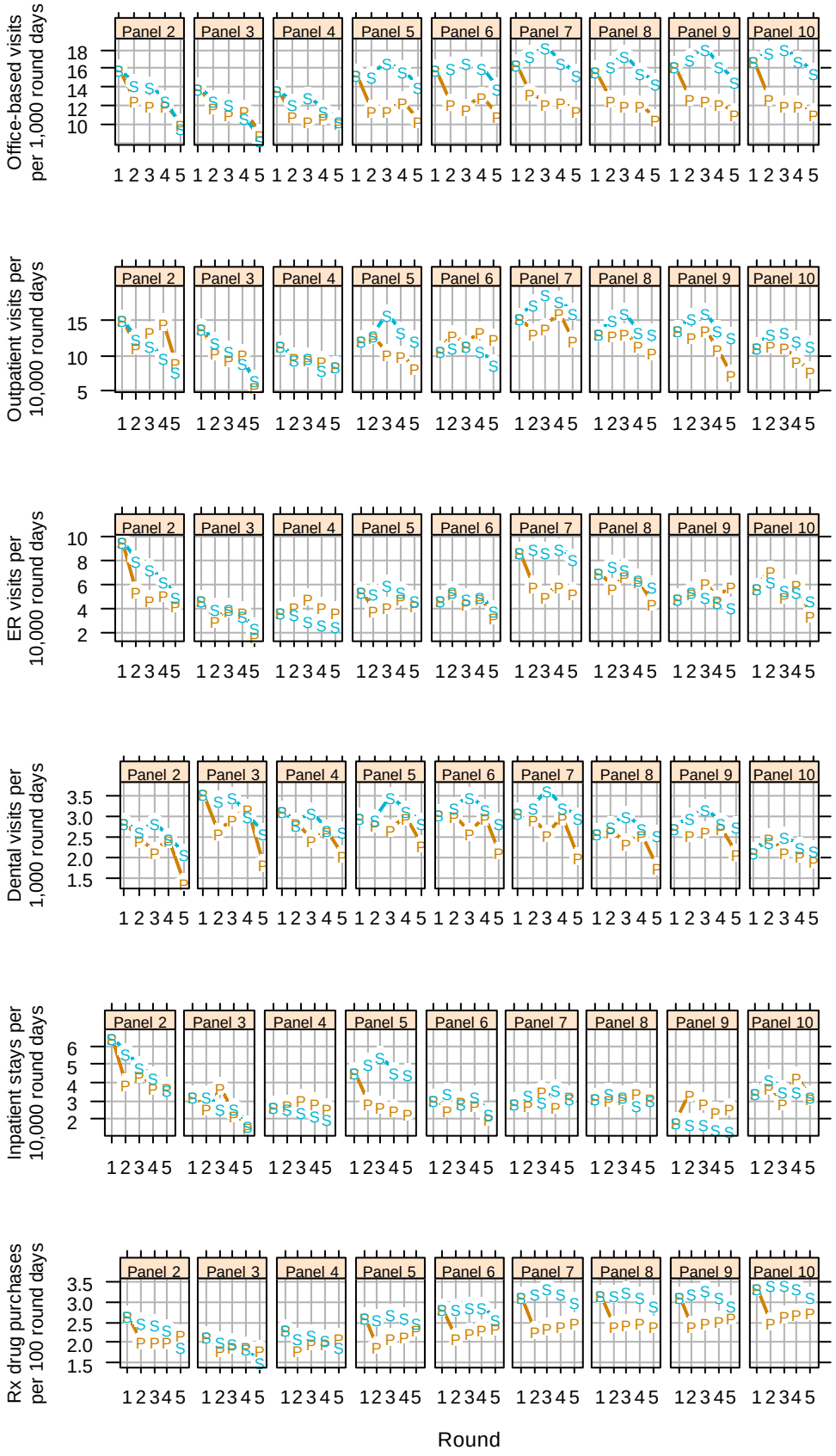

Figure 4 Differential event reporting after Round 1

which also showed a rate underestimation at Round 1. Finally, the model for inpatient stays showed the tendency to underestimate the Round 1 rate in Panels 3, 4 and 9.

The results of the simulations are shown in Figure 4. These charts should be interpreted with the results from the combined-model fits in mind. In general, where the models fit well, the simulations showed a significant effect of differential event reporting after Round 1. This can be seen most clearly for the office-based visits and prescription drug purchases starting with Panel 5 and continuing through Panel 10. That is, there does not appear to be much if any effect of differential reporting prior to Panel 5; however, starting with Panel 5, the effect is pronounced in all panels. The trend also appears for dental and outpatient department visits starting around Panel 5 as well. It's less clear for the outpatient department visits because the model did not fit well in the earlier panels. This trend was not seen for the emergency room visits or hospital inpatient stays.

The results of the annualized estimate of the effect of differential reporting are shown in Figure 5. Prior to year 2000—when Panel 5 began—the differential between the simulated and predicted events nationally was about 10%. Starting with year 2000 data, the difference grew to more than 25%. A similar trend can been seen with the prescription drug purchases. The differential was about 10% until 2000, then it increased to over 20%. A large effect of differential reporting can also be detected for hospital outpatient department visits starting in 2001. It appears to have been lower in 2002; however, that is probably just an artefact of the model's underprediction of the Round 1 reporting rate in Panel 7. Problems with the model for outpatient department events in the earlier panels prevented detection of differential event reporting prior to 2001 in the simulations; however, it appears after Panel 5, which is consistent with the pattern for office-based visits and prescription drug purchases. Differential reporting of dental events appeared to have started earlier than Panel 5, however, if the high rate in 1998 is attributable to the overestimation of the Round 1 model-predicted event reporting rate, then the trend for the dental visits would resemble that for the office-based visits and prescription drug purchases as well. The other event types—emergency room visits and inpatient stays—did not appear to show differential event reporting. That is, the annual effect of differential event reporting for these types was just as likely to be positive as it was to be negative.

Summary

Round specific event reporting differentials appears to have become more serious for some MEPS event types starting in Panel 5 and was first evident in the annual national estimates beginning in the year 2000. The effect is most evident for office-based visits and prescription drug purchases but also appears for the outpatient department and dental visits as well. It does not appear to be present for emergency room visits or inpatient stays however. A possible explanation is that these latter two event types occur much less frequently and therefore have much less of an opportunity to be affected by differential event reporting.

A possible explanation for the differential event reporting starting in 2000 is the increased survey burden that occurred starting around year 2000. With Panel 5, MEPS added several new sections to the survey: the Self Administered Questionnaire (SAQ),

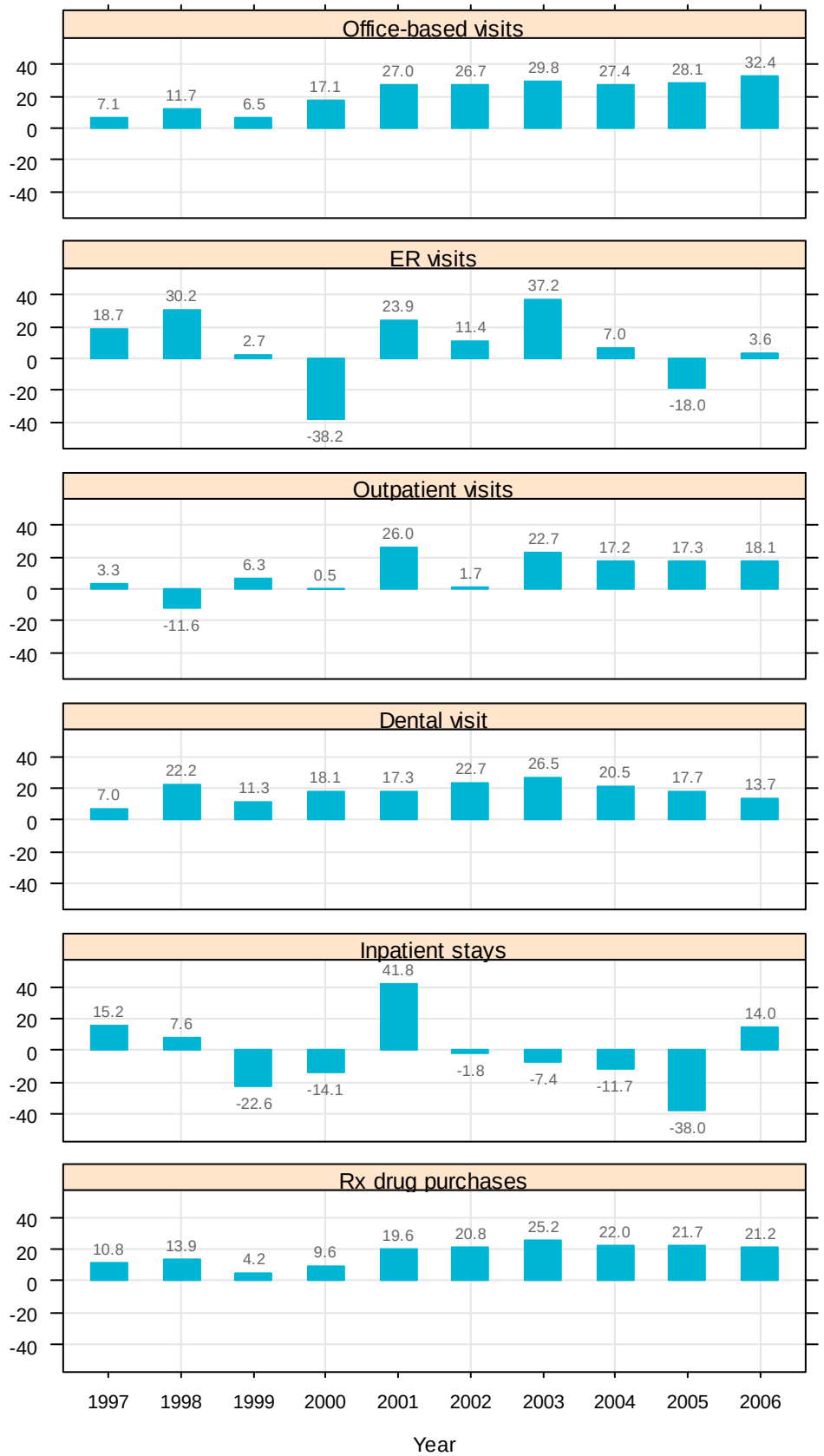

Figure 5 Estimated annual effect of differential event reporting: percent difference between simulated and predicted national estimates

the Parent Administered Questionnaire (PAQ), the Children with Special Health Care Needs (CSHCN) Screener instrument, and the Diabetes Care Survey (DCS). As shown in Figure 6, these all added items to the survey and hence more administration time. It may be that the inclusion of these questions impacted respondent's event reporting after Round 1.

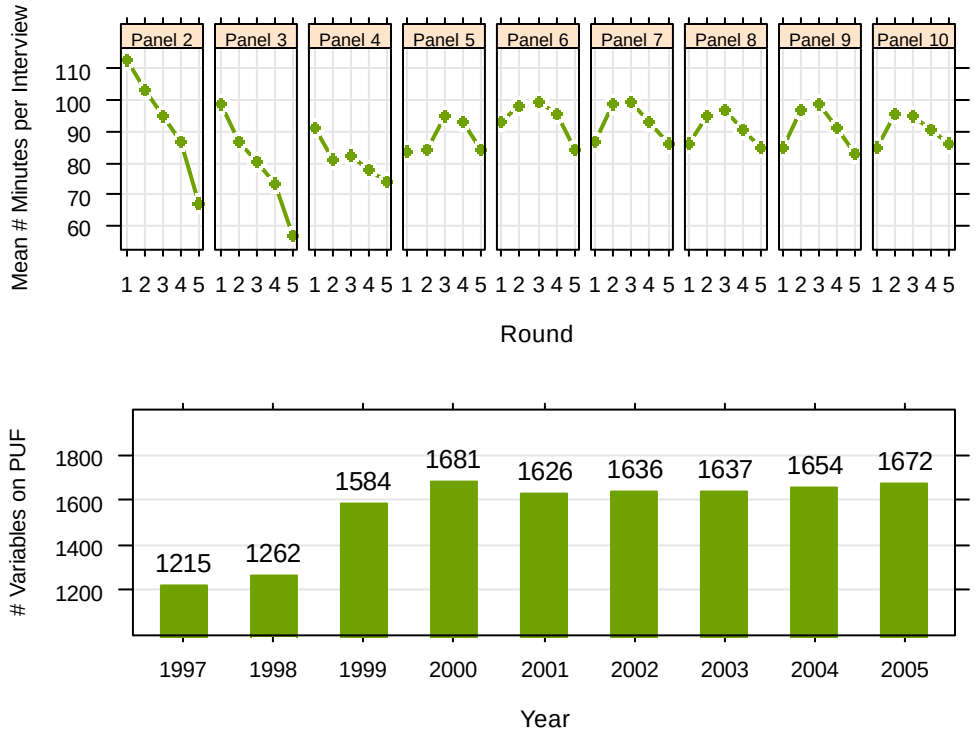

Figure 6 Survey burden over time

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