A Methodological Comparison of Ambulatory Health Care Data Collected in Two National Surveys

Steven R. Machlin and Marc W. Zodet

Agency for Healthcare Research and Quality Working Paper No. 07001

October 2007

Suggested citation: Machlin SR, Zodet MW. A Methodological Comparison of Ambulatory Health Care Data Collected in Two National Surveys. Agency for Healthcare Research and Quality Working Paper No. 07001, October 2007, http://gold.ahrq.gov.

AHRQ Working Papers provide preliminary analysis of substantive, technical, and methodological issues. The papers have not undergone external peer review. They are distributed to share valuable experience and research. Comments are welcome and should be directed to the authors. The views expressed are those of the authors and no official endorsement by the Agency for Healthcare Research and Quality or the Department of Health and Human Services is intended or should be inferred.

A Methodological Comparison of Ambulatory Health Care Data Collected in Two National Surveys

ABSTRACT

Access and expenditures for health care are critical areas of interest for health services researchers and policy makers. Surveys, administrative data, and other sources that contain health care utilization data used to analyze these issues have varying objectives and data collection methodologies. Consequently, it is important for analysts to understand the strengths and limitations of the particular data source(s) they are using, and not presume that similar estimates or conclusions would result from the use of an alternative data source. The purpose of this paper is to illustrate the types of complexities and differences that arise when comparing estimates of health care utilization from different sources. In particular, we compare 2004 data on ambulatory health care utilization (excluding dental care) collected in the Medical Expenditure Panel Survey (MEPS) and the National Health Interview Survey (NHIS), two nationally representative surveys sponsored by the U.S. Department of Health and Human Services.

Steven R. Machlin, MS
Agency for Healthcare Research and Quality
Division of Statistical Research and Methods
Center for Financing, Access, and Cost Trends
540 Gaither Road
Rockville, MD 20850
steven.machlin@ahrq.hhs.gov
Phone: 301-427-1480

and

Marc W. Zodet, MS
Agency for Healthcare Research and Quality
Division of Statistical Research and Methods
Center for Financing, Access, and Cost Trends
540 Gaither Road
Rockville, MD 20850
marc.zodet@ahrq.hhs.gov
Phone: 301-427-1563

A Methodological Comparison of Ambulatory Health Care Data Collected in Two National Surveys

1. Introduction

Access and expenditures for health care are critical areas of interest for health services researchers and policy makers. Surveys, administrative data, and other sources that contain health care utilization data used to analyze these issues have varying objectives and data collection methodologies. Consequently, it is important for analysts to understand the strengths and limitations of the particular data source(s) they are using, and not presume that similar estimates or conclusions would result from the use of an alternative data source.

The purpose of this paper is to illustrate the types of complexities and differences that arise when comparing estimates of health care utilization from different sources. In particular, we compare 2004 data on ambulatory health care utilization (excluding dental care) collected in the Medical Expenditure Panel Survey (MEPS) and the National Health Interview Survey (NHIS), two nationally representative surveys sponsored by the U.S. Department of Health and Human Services. The NHIS is a cross-sectional household interview survey that collects annual data that are used to monitor the nation's health on a broad range of health topics (http://www.cdc.gov/nchs/nhis.htm). For each family in the NHIS, one sample adult and one sample child under 18 years of age (if any children are in the household) are randomly selected for the Adult and Child Core questionnaires, respectively. The MEPS, which is drawn as a subsample of households that participated in the prior year's NHIS, collects detailed data on health care use, expenditures, sources of payment, insurance coverage, and quality of care (http://www.meps.ahrq.gov/). The panel design of the survey includes 5 rounds of interviews

that cumulatively cover two consecutive calendar years (consecutive panels that overlap are used to produce annual estimates). At each interview, one adult respondent typically provides information about all persons in the MEPS reporting unit (defined as a person or group of persons who are related by blood, marriage, adoption, foster care or other family association). Both NHIS and MEPS collect data through personal household interviews and cover the U.S. civilian noninstitutionalized population.

2. Ambulatory Care Data Collection Methodologies

The approach to collecting health care utilization data differs substantially between the two surveys. In the NHIS respondents are asked a series of questions about the frequency of health care visits in the past 12 months, and the following 9 response categories are provided: None, 1, 2-3, 4-5, 6-7, 8-9, 10-12, 13-15, and 16 or more. Ambulatory care utilization is captured through two separate questions; one on frequency of emergency room use in the past 12 months and another on frequency of visits to health care professionals in a doctor's office, clinic, or some other place in the past 12 months (see Appendix I for survey questions). In contrast, MEPS health care utilization data are collected as a precursor to the collection of associated expenditure data. Annual data are based on three interviews at different times in which a household respondent is asked to enumerate all health care visits for household members in the interview reference period (typically a retrospective period of 3-6 months). Respondents are asked to classify ambulatory visits they report into the following three categories based on setting of care: office-based visits, hospital outpatient department visits, and hospital emergency room visits. Consequently, detailed data on number of visits are available from MEPS because

an annual count of visits for each MEPS sample person is constructed as compared to NHIS data that are based on categorical ranges.

3. Comparison of Selected Estimates for 2004

This section compares NHIS and MEPS distributions and summary statistics (average and total visits) on ambulatory care use in 2004. Comparisons are made separately for emergency room and other ambulatory visits. The NHIS sample size is 43,980[1] while the MEPS sample size is 32,737. Estimates shown in the tables are weighted to account for the complex survey design and adjust for nonresponse (Botman, Cohen).

To compare estimates of the distribution of visits, we classified MEPS annual data into the 9 NHIS question categories listed in the methodology section above. In addition, we combined office-based and hospital outpatient department visits reported in MEPS into one category to make MEPS data for non-emergent ambulatory care as comparable as possible to that collected in the NHIS.

To produce estimates of means and totals from NHIS it is necessary to make an assumption about the average value for each question category. We computed estimates using 2 different "average" values --the lower bound and midpoint of the NHIS question response range categories (except for 0 and 1 which constitute their own categories and the upper bound category of 16 or more--see Appendix II for details).[2] To facilitate comparisons we also

[1] A small percentage of the NHIS sample was excluded from the estimates due to item nonresponse (see footnotes to tables). Because MEPS data are based on counts of reported medical care events, by definition there are no missing utilization data in the survey (i.e. no reported events means no use).

[2] We did not compute estimates using the upper bound of the NHIS categories because MEPS data indicate that visits are generally skewed toward the lower end of the NHIS categories (see Tables 1a and 1b). We used the same value for the top category (16 or more visits) for both the lower bound and midpoint estimates, but used different values depending on the type of visit (i.e., 16 for emergency room visits and 31.7 for other ambulatory visits). For emergency room visits we used the lower bound for the top category (16) because the MEPS sample had no persons

produced adjusted MEPS estimates of means and totals by applying the lower bound and midpoint of the NHIS question response range categories to the MEPS data. Unadjusted "direct" estimates based on the actual MEPS count data are also included in summary data tables (2a and 2b).

3.1 Distributions of Number of Visits

MEPS estimates of the frequency of *non-emergent ambulatory visits* are higher at the extremes of the distribution compared to NHIS (Table 1a). In particular, while the estimated percent of persons with no ambulatory visits is substantially higher in MEPS (27.2 percent) than NHIS (17.5 percent), the percent with a large number of visits was also higher (MEPS estimate of 12.5 percent with 13 or more visits versus only 7.2 percent for NHIS). Conversely, the estimated percent of persons with visits between these extremes (1-12 visits) was lower in MEPS (60.3 percent) than NHIS (75.4 percent).

The MEPS distribution of number of *emergency room visits* is somewhat lower than the NHIS distribution (Table 1b). According to MEPS, 85.8 percent of the population had no emergency room visit during 2004 while NHIS estimates that 79.3 percent of persons had no ER visit in the 12 months preceding the 2004 interview. The estimated percent of persons with 2 or more ER visits was about twice as high in NHIS as MEPS (7.6 percent versus 3.7 percent).

3.2 Aggregate Total Number of Visits

MEPS estimates of the total number *of non-emergent ambulatory visits* are higher than NHIS estimates (Table 2a). More specifically, the MEPS estimate is 28 percent higher than

---

with more than 16 visits. For other ambulatory visits we used the average number of visits for MEPS sample persons with 16 or more visits (31.7).

NHIS for the lower bound comparison (1.61 versus 1.25 billion) and 25 percent higher for the midpoint comparison (1.69 versus 1.34 billion). While the estimated percent of persons with one or more ambulatory visits is lower in MEPS (72.9 percent) than NHIS (82.5 percent), the MEPS average for those with at least one visit exceeds the corresponding NHIS estimate by 2.2 visits per person for both the lower bound (7.5 versus 5.3) and midpoint approaches (7.9 versus 5.7). These higher averages are explained by a larger proportion of cases reporting 13 or more visits (12.5 versus 7.2 percent), which ultimately drives the larger MEPS estimates of total non-emergent ambulatory visits.

In contrast to non-emergent ambulatory visits, NHIS estimates of the total number of *emergency room visits* are nearly twice as large as the corresponding MEPS estimates for both the lower bound (103 versus 55.1 million) and midpoint (114.1 versus 60 million) approaches (Table 2b). These differences are driven by larger NHIS estimates than MEPS of both: a) the proportion of the population with 1 or more emergency room visits (20.7 versus 14.2 percent), and b) the average number of visits per person with at least one emergency room visit (1.73 versus 1.3 per person for lower bound estimates and 1.92 versus 1.4 per person for midpoint estimates).

4. Discussion/ Summary

Using data from the MEPS and NHIS, this paper demonstrates that the types of health care utilization estimates that can be made and the magnitude of those estimates can be quite different based on household surveys with different methodologies. Following is a summary of the major differences in data collection methodologies across the two surveys and the potential impact of these differences on survey estimates.

Ambulatory setting categories: NHIS ambulatory care utilization data are captured through two separate questions; one on frequency of emergency room use and another on frequency of visits to health care professionals in a doctor's office, clinic, or some other place. MEPS respondents are asked to classify ambulatory visits they report into three categories based on setting of care: hospital emergency room visits, office-based visits, and hospital outpatient department visits. These differences in setting categories could contribute toward the divergent survey estimates. For example, it is possible that a visit reported in MEPS as having occurred in a hospital outpatient department would have been reported by a comparable respondent in NHIS as an emergency room visit since there is not a separate question for hospital outpatient department visits.

Question style: NHIS asks respondents to pick a range (10 categories) in which the number of visits for the person falls while MEPS asks respondents to enumerate all visits for the sample person, a process that results in a specific number of visits for each sample person. While both surveys can be used to estimate the percentage of the population with at least one visit during the year, NHIS data are less suitable for estimating a total or mean because it requires assigning a value to the different categorical ranges. This is most problematic for the highest category because it has an open ended range (16 or more visits), so it is not possible, for example, to apply a midpoint value. Moreover, because it is unlikely that a person would have more than 16 visits to an emergency room in a 12 month period but much more likely that an individual would have substantially more than 16 visits to other ambulatory settings, it is more difficult to assign a reasonable value for the top category of the question on ambulatory visits to "doctor's offices, clinics, and other places." To produce the NHIS estimates in Table 2a, we assumed that the

average number of office-based and hospital outpatient department visits combined from MEPS is a reasonable average value for the top category. It would not have been possible to produce estimates of means and totals from NHIS without making assumptions about the average value or distribution for each category.

Question reference period & number of interviews: The NHIS question refers to the past 12 months while MEPS data are cumulated across 3 interviews with an average recall period of about 5-6 months. These differences likely have an impact on resultant estimates. For example, the longer NHIS recall period may make the responses more prone to overestimation biases associated with telescoping (Bradburn). While one would generally expect the shorter reference period in MEPS to facilitate more accurate reports of utilization from respondents, respondent fatigue across multiple interviews coupled with the increased burden of additional questions on expenditures and sources of payment that are associated with reported health care visits may produce incentives for MEPS respondents to underreport visits. The direction of differences between estimates from the two surveys are not completely consistent with these explanations, which highlights the difficulty in ascribing exact reasons for discrepancies across surveys with different methodologies.

It is difficult to ascribe the extent to which the differences between MEPS and NHIS discussed in this paper explain varying estimates of health care utilization. For example, the NHIS estimates of total 2004 emergency department visits based on the methodology used in this paper are substantially closer than MEPS to the total estimate from the National Hospital Ambulatory Medical Care Survey (NHAMCS)[3], a national survey based on a sample of hospitals rather than households. While the MEPS aggregate population estimate of emergency

[3] NAMCS estimate of emergency room visits in 2004 is 110.2 million.

department use may be low due to underreporting of emergency room visits and/or misclassification of some visits as occurring in other settings, there may be overestimation in NHIS due to telescoping. Moreover, estimates from NHAMCS may be higher than MEPS due to methodological differences. In particular, what a household respondent in MEPS would consider to be an emergency room visit would not necessarily be consistent with how such visits are counted in the NHAMCS from the provider perspective. For example, a hospital visit that was initiated in the emergency room but then immediately referred to another department for tests may be reported as an outpatient visit in MEPS but counted as an emergency room visit in NHAMCS. In summary, whether working with one or multiple data sources, it is important for researchers to assess the strengths and limitations of the particular source(s) being used, and to use caution when interpreting and comparing estimates.

References

Botman SL, Moore TF, Moriarity CL, and Parsons VL. Design and estimation for the National Health Interview Survey, 1995–2004. National Center for Health Statistics. Vital Health Stat 2(130). 2000.

Bradburn, N. M., J. Huttenlocher, and L. V. Hedges. 1994. ‘‘Telescoping and Temporal Memory.’’ In Autobiographical Memory and the Validity of Retrospective Reports, edited by N. Schwartz, S. Sudman. New York: Springer-Verlag.

Cohen SB, DiGaetano R, Goksel H. Estimation procedures in the 1996 Medical Expenditure Panel Survey Household Component. Rockville (MD):Agency for Health Care Policy and Research; 1999. MEPS Methodology Report No. 5. AHCPR Pub.No. 99-0027.

Hing E, Cherry DK, Woodwell Da. National Ambulatory Medical Care Survey: 2004 summary. Advance data from vital and health statistics; no 374. Hyattsville, MD: National Center for Health Statistics, 2006.

Table 1a: Distribution of Non-Emergency Room Ambulatory Visits, 2004

	Sample Sizes		Percent (SE)	
Number of Visits	**MEPS**	**NHIS[4]**	**MEPS**	**NHIS**
0	10010	7665	27.2 (.45)	17.5 (.26)
1	5332	7679	15.8 (.32)	18.3 (.26)
2-3	6154	11806	19.3 (.29)	27.6 (.26)
2	3608	--	11.1	--
3	2546	--	8.1	--
4-5	3179	6195	10.3 (.22)	14.3 (.20)
4	1797	--	5.8	--
5	1382	--	4.5	--
6-7	1957	2984	6.4 (.16)	6.8 (.13)
6	1121	--	3.7	--
7	836	--	2.7	--
8-9	1251	1530	4.2 (.15)	3.3 (.11)
8	677	--	2.2	--
9	574	--	1.9	--
10-12	1327	2237	4.5 (.15)	5.0 (.12)
10	528	--	1.7	--
11	433	--	1.5	--
12	366	--	1.3	--
13-15	926	840	3.3 (.12)	1.9 (.08)
13	357	--	1.3	--
14	320	--	1.1	--
15	249	--	0.9	--
16+	2601	2239	9.2 (.26)	5.3 (.13)

[4] Excludes 805 observations with missing data on survey question

Table 1b: Distribution of Emergency Room Visits, 2004

	Sample Sizes		Percent (SE)	
Number of Visits	**MEPS**	**NHIS**[5]	**MEPS**	**NHIS**
0	28057	34363	85.8 (.25)	79.3 (.28)
1	3547	5752	10.9 (.22)	13.1 (.21)
2-3	970	2661	2.8 (.11)	5.8 (.15)
2	768	--	2.2	--
3	202	--	0.6	--
4-5	114	478	0.3 (.03)	1.0 (.06)
4	83	--	0.2	--
5	31	--	0.1	--
6-7	28	166	0.1 (.02)	0.4 (.03)
6	15	--	0.1	--
7	13	--	0.0	--
8-9	12	67	0.0 (.01)	0.2 (.02)
8	6	--	0.0	--
9	6	--	0.0	--
10-12	7	72	0.0 (.01)	0.1 (.02)
10	2	--	0	--
11	1	--	0	--
12	4	--	0.0	--
13-15	2	30	0	0.1 (.01)
13	1	--	0	--
14	1	--	0	--
15	0	--	0	--
16+	0	49	0	0.1 (.02)

Table 2a: Non-Emergency Room Ambulatory Visits: Comparison of Selected Summary Statistics, 2004

	Direct (SE)		Lower Bound (SE)		Midpoint (SE)	
Estimate	**MEPS**	**NHIS**	**MEPS**	**NHIS**	**MEPS**	**NHIS**
Total Visits (millions)	1675.6 (44.2)	--	1605.6 (38.1)	1249.7 (17.7)	1687.1 (39.5)	1343.3 (18.5)
Percent with 1+ visits	72.9 (0.5)	82.5 (0.3)	--	--	--	--
Mean per person with visit	7.8 (0.1)	--	7.5 (0.1)	5.3 (5.2)	7.9 (0.1)	5.7 (5.2)

Table 2b: Emergency Room Visits: Comparison of Selected Summary Statistics, 2004

	Direct (SE)		Lower Bound (SE)		Midpoint (SE)	
Estimate	**MEPS**	**NHIS**	**MEPS**	**NHIS**	**MEPS**	**NHIS**
Total Visits (millions)	57.5 (1.7)	--	55.1 (1.6)	103 (2.2)	60.0 (1.8)	114.1 (2.4)
Percent with 1+ visits	14.2 (0.3)	20.7 (0.3)	--	--	--	--
Mean per person with visit	1.4 (0.0)	--	1.3 (0.0)	1.73 (2.2)	1.4 (0.0)	1.92 (2.3)

[5] Excludes 342 observations with missing data on survey question.

Appendix I: 2004 NHIS Survey Questions on Ambulatory Care

DURING THE PAST 12 MONTHS, HOW MANY TIMES have [you/sample child] gone to a HOSPITAL EMERGENCY ROOM about [your/sample child's] health? (This includes emergency room visits that resulted in a hospital admission.)

00	None
01	1
02	2-3
03	4-5
04	6-7
05	8-9
06	10-12
07	13-15
08	16 or more
97	Refused
99	Don't know

DURING THE PAST 12 MONTHS, HOW MANY TIMES have [you/sample child] seen a doctor or other health care professional about [your/sample child's] health at a DOCTOR'S OFFICE, A CLINIC, OR SOME OTHER PLACE? Do not include times [you/sample child] were hospitalized overnight, visits to hospital emergency rooms, home visits, dental visits, or telephone calls.

00	None
01	1
02	2-3
03	4-5
04	6-7
05	8-9
06	10-12
07	13-15
08	16 or more
97	Refused
99	Don't know

Appendix II. NHIS vs. MEPS: Values Used for Estimating Means and Totals for Comparison[1]

NHIS Category	Lower Bound	Midpoint
0	0	0
1	1	1
2-3	2	2.5
4-5	4	4.5
6-7	6	6.5
8-9	8	8.5
10-12	10	11
13-15	13	14
16 or more	16 (ER), 31.7 (Other Ambulatory)	16 (ER), 31.7 (Other Ambulatory)