EVALUATION OF THE CAPACITY FOR MORE DETAILED ANALYSES OF GEOGRAPHIC VARIATION IN SELECT HEALTHCARE MEASURES USING THE MEDICAL EXPENDITURE PANEL SURVEY[1]

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INTRODUCTION

Federal agencies and other users of Federal survey data commonly publish/present estimates that are stratified across Census Regions as well as for Metropolitan/non-Metropolitan Statistical Areas (MSA/non-MSA). Comparisons across these broadly defined geographic areas may veil important distinguishing characteristics between diverse rural and urban settings that may affect the delivery and quality of healthcare services for certain populations. The Agency for Healthcare Research and Quality (AHRQ), starting in 2003, has been charged with producing an annual report on healthcare disparities in the United States. The report will place special emphasis on the healthcare disparities observed among identified priority populations including low-income groups, minority groups, women, children, elderly, and persons with special healthcare needs (e.g., persons with disabilities, etc.). In addition, the disparities report is to address healthcare experiences of persons in inner-city and rural areas.

This paper provides preliminary estimates on several measures to be included in the forthcoming disparities report as they pertain to geographic location (i.e., urban/rural). These estimates are drawn from the Medical Expenditure Panel Survey (MEPS) which will be a primary data source for the healthcare disparities report. In addition to the commonly used MSA/non-MSA designation, estimates were produced reflecting the degree of urbanization across two variants of a more detailed geographic continuum. The objectives of this paper are to determine whether or not the MEPS data offer sufficient sample size to produce reliable estimates across these geographic continuums in order to evaluate any disparities in healthcare measures.

GEOGRAPHIC DEFINITIONS

The two principal definitions used to distinguish rural and urban settings are the "Rural-Urban" classification set forth by the U.S. Bureau of the Census and the MSA/non-MSA classification as designated by the U.S. Office of Management and Budget (OMB) (Ricketts). These definitions are frequently used by federal agencies and researchers in the health service research community for collecting, analyzing and publishing data. Though not specifically designed for this purpose the OMB's MSA/non-MSA designation has been used to operationalize social programs and for determining resource allocation. For example, MSA/non-MSA status has been used to categorize hospitals as either rural or urban for purposes of Medicare reimbursement (Ricketts).

Recently efforts have focused on moving beyond a dichotomous classification of geographic locale (i.e., urban/rural) and towards development of a manageable coding scheme to allow more precise definitions of urbanicity/rurality along a continuum. The commonly used definitions set forth by the Bureau of Census and the OMB as well as two alternative methods of categorizing counties along a continuum are summarized below.

Urban – Rural (U.S. Bureau of the Census)
The Bureau of the Census defines an urbanized area as a continuously built-up area with a population of ≥50,000 residents which includes one or more central places and the adjacent densely settled surrounding area. The population density of an urbanized area generally exceeds 1,000 inhabitants per square mile. All territory, population, and housing in urbanized areas and in places of ≥2,500 persons outside urbanized areas are designated as urban. In addition, any incorporated place or unincorporated areas with a densely settled population center (i.e., ≥2,500 inhabitants) with a name and community identity are also classified as urban (Ricketts). Rural areas are designated as all territories, populations, and housing units not classified as urban. These include incorporated and unincorporated places with less than 2,500 inhabitants which are outside urbanized areas (Ricketts).

With a few exceptions, places are either designated as urban or rural. The exceptions are extended cities which are incorporated places containing large expanses of sparsely populated territory. For these areas the Census Bureau provides separate urban and rural population counts (Ricketts).

Metropolitan (MSA) – non-Metropolitan (non-MSA) (U.S. Office of Management and Budget)
Core counties with at least one central city with a population of ≥50,000 inhabitants, Census Bureau defined urbanized areas with a total metro area population of ≥100,000 inhabitants (≥75,000 in New England), and fringe counties economically tied to these counties are classified as metropolitan. Geographic areas in New England are defined in terms of cities and towns rather than counties. The underlying impetus for defining a metropolitan area is to identify a core area containing a large population nucleus as well as all adjacent counties which have a high degree of economic and social integration with the core (Ricketts). All counties outside these boundaries which have no cities with at least 50,000 residents are categorized as non-metropolitan (Economic Research Service/U.S. Department of Agriculture).

Rural-Urban Continuum Codes (U.S. Department of Agriculture – Economic Research Service)

[1]The views expressed in this paper are those of the author and no official endorsement by the Department of Health and Human Services or the Agency for Healthcare Research and Quality is intended or should be inferred.

The Rural-Urban Continuum codes (a.k.a. Beale codes) were developed by the U.S. Department of Agriculture and organize all counties into 10 categories. The coding scheme uses as its basis the OMB Metropolitan/non-Metropolitan classification and further categorizes counties according to their degree of "urbanicity" or "rurality" (Ricketts). Metropolitan counties are grouped into four categories based on size. These include central counties with a population of ≥1 million; fringe counties of ≥1 million; counties in metropolitan areas with populations of 250,000-999,999; and counties in metropolitan areas with populations of <250,000 (Ricketts). Non-Metropolitan counties are further classified into six categories based on the size of their urban population and their proximity to metropolitan areas. These remaining six categories are counties with an urban population of ≥20,000 inhabitants that are adjacent to a metropolitan area; counties with an urban population of ≥20,000 inhabitants that are not adjacent to a metropolitan area; counties with an urban population of 2,500-19,999 that are adjacent to a metropolitan area; counties with an urban population of 2,500-19,999 that are not adjacent to a metropolitan area; counties with a "completely rural" population of <2,500 adjacent to a metropolitan area; and counties with a "completely rural" population of <2,500 not adjacent to a metropolitan area (Ricketts). The term adjacent as it pertains to these categories refers to physical adjacency with one or more metropolitan areas and at least 2% of the employed labor force commuting to the central metropolitan county.

Urban Influence Codes (U.S. Department of Agriculture)

The U.S. Department of Agriculture's Urban Influence codes catalogs all counties and county equivalents into nine categories. As with the Rural-Urban Continuum codes this coding scheme begins with the OMB MSA/non-MSA classifications. Metropolitan areas are divided into two groups: those with at least one million residents and those with fewer than one million residents. Non-metropolitan counties are grouped according to whether they are adjacent to large metropolitan areas, small metropolitan areas, or not adjacent to a metropolitan area (Ghelfi). Non-metropolitan counties adjacent to large metropolitan areas and those adjacent to small metropolitan areas are further classified by the largest place they contain: those containing all or part of a city with a population of ≥10 thousand and those which do not contain part of a city with a population of ≥10 thousand. The remaining non-metropolitan counties which are not adjacent to a metropolitan area are classified into three groups: those counties with a population of ≥10 thousand; those counties with a population between 2,500 and 9,999; and those counties with no city or a city with a population <2,500.

Differences between the Rural-Urban Continuum Codes and the Urban Influence Codes

The most substantial difference between the two coding schemes, as cited by the developers of the Urban Influence Codes, lie in the grouping logic of the non-Metropolitan counties. The Rural-Urban Continuum Codes simply classify non-Metropolitan counties as either adjacent or not adjacent to a metropolitan area. The Urban Influence codes distinguish counties as either adjacent to large urban area, adjacent to a small urban area, or not adjacent to an urban area. In addition, for the Rural-Urban Continuum scheme, the degree of urbanization in non-Metropolitan counties is determined by the total number of urban residents in the county. The Urban Influence codes define the degree of urbanization in non-Metropolitan counties based on the largest city in the county.

An additional difference is that the Rural-Urban Continuum Codes differentiate between central and fringe counties within large metropolitan areas and distinguish between two population sizes for smaller metropolitan areas, while the Urban Influence codes only separate metropolitan counties into large and small based on a population size cutoff of one million inhabitants (Ghelfi).

METHODS

Data

Data from MEPS and the Area Resource File (ARF) were linked and used to generate estimates of healthcare measures across alternative classifications of geographic areas. MEPS is an ongoing nationally representative survey of medical care use and expenditures sponsored by the AHRQ. MEPS provides estimates of insurance coverage, healthcare utilization, expenditures, and sources of payment for the U.S. civilian non-institutionalized population from data collected via multiple contacts over a 2 ½ year period. Additional information on MEPS content and survey design are available at www.meps.ahrq.gov. The ARF database is maintained by Quality Resource Systems, Inc., and contains county specific information on health facilities, health professions, measures of resource scarcity, health status, economic activity, health training programs, and socioeconomic and environmental characteristics. The ARF file also contains multiple geographic coding schemes which aggregate counties into various geographic groupings. Additional detail regarding the ARF can be found at www.arfsys.com.

The Rural-Urban Continuum and the Urban Influence Codes from the ARF (February 2001 Release) were merged onto the 1998 MEPS Household Component (MEPS-HC) file using the Federal Information Processing Standards (FIPS) state and county codes. The 1998 MEPS-HC contained 24,072 respondents. The initial merge yielded 634 persons with missing state/county values. To assign state/county values to these 634 persons the following logic was applied:

1. If there was a single state/county value within the dwelling unit, then assign this value to those with missing values within the dwelling.
2. Otherwise, if there was a reference person within the family (with a state/county value), then assign this person's state/county value to those with missing values within the family.
3. Otherwise, if there was no reference person, but there was a single state/county value within the family, then assign this value to those with missing values within the family.
4. Otherwise, state/county remained missing.

Upon application of this logic there remained only 4 persons with no state/county information and their information was treated as missing for this analysis.

National estimates of selected healthcare measures were then derived stratifying the data by each of the following: 1) MSA/non-MSA, 2) the Rural-Urban Continuum code (10 levels), and 3) the Urban Influence code (9 levels).

Healthcare Measures

For this paper measures were examined for three dimensions of healthcare in the United States: 1) access to care, 2) utilization, and 3) expenditures.

Access to Care was examined by estimating the proportion of persons reporting to have no usual source for healthcare services.

Utilization was measured as the proportion of patients with at least one office-based/hospital outpatient visit.

Healthcare Expenditures were measured as the average office-based/hospital outpatient expenditures for persons with office-based/hospital outpatient visits.

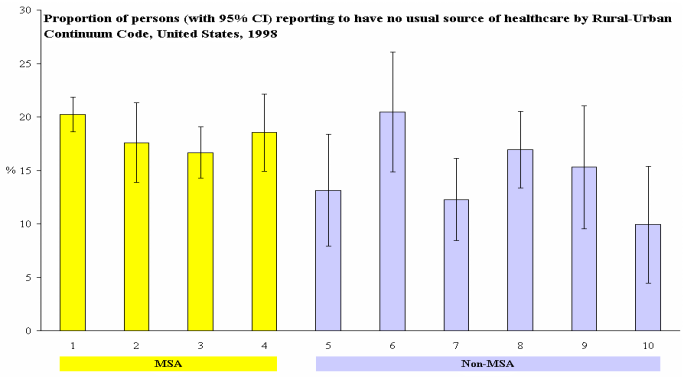
Analyses were performed using STATA v7.0 statistical software (www.stata.com) so as to produce variance estimates reflecting the complex survey design of the MEPS. Analyses presented in this paper are descriptive and are limited to bivariate associations between geographic setting and healthcare outcome measures. The overall association between geographic setting and the proportion of persons reporting no usual source for healthcare and the proportion of persons with at least one office-based/hospital outpatient visit were evaluated using Pearson's χ^2-statistic. Level to level comparisons (e.g., comparisons between each of the 10 levels of the Rural-Urban Continuum code) were evaluated using the t-statistic. The overall effect of geographic setting on mean expenditures was examined by using the F-statistic from a one-way Analysis of Variance (ANOVA) model. Level to level comparisons were again evaluated using the t-statistic. No adjustments were made to account for multiple comparisons or multiple hypotheses testing. All statements of statistical significance are made at the α=0.05 level. All significant pairwise differences for each geographic coding scheme are indicated in the far right column of Tables 1-3.

RESULTS

Access to care

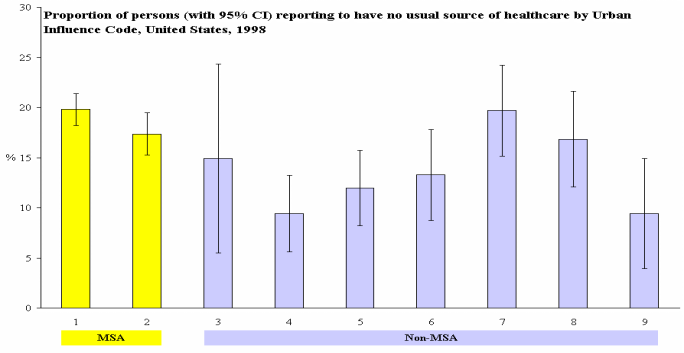
Estimates of the proportion of persons reporting to have had no usual source for healthcare by geographic setting are presented in Table 1. This proportion was significantly larger in MSAs compared to non-MSAs (18.88% vs. 14.72%, p=0.003). When stratifying by the Rural-Urban Continuum Code, the overall association between geographic location and the proportion reporting no usual source for healthcare was statistically significant (p=0.0018). The proportion of persons reporting no usual source for healthcare was largest for metro central counties with a population of ≥1 million people (20.24%) and non-metro counties not adjacent to a metro area with an urban population of ≥20,000 people (20.46%). Non-metro counties not adjacent to a metro area with no places with a population of ≥2,500 people exhibited the smallest proportion reporting no usual source (9.94%). In general, the proportion of persons with no usual source for healthcare was greater for more of the MSA subgroups than for the non-MSA subgroups. For example, the proportion with no usual source for healthcare for metro counties with a population of <250,000 (18.53%) was nearly twice that of the non-metro counties not adjacent to a metro area with no places with a population of ≥2,500 (9.94%): p=0.010. There was also observed variation between the subgroups of both MSAs and non-MSAs (e.g., metro central counties with a population of ≥1 million (20.24%) compared to metro counties with a population of 250,000 – 999,999(16.67%), p=0.022). Figure 1a illustrates the variation in subgroup estimates both between and within MSA and non-MSA when considering the Rural-Urban Continuum coding.

Figure 1a.



The overall association between geographic location and the reporting of no usual source for healthcare was also significant when stratifying by the Urban Influence Code (p=0.006). The largest proportions were observed for large metro central and fringe counties with a population of ≥1 million (19.81%) and non-metro counties not adjacent to a metro area with a city of ≥10,000 inhabitants (19.69%). The smallest proportions were observed for non-metro counties not adjacent to a metro area with no city or no city with <2,500 inhabitants (9.43%) and non-metro counties adjacent to a large metro area with no city with ≥10,000 inhabitants (9.42%). Variation in subgroup estimates between and within MSA and non-MSA when considering the Urban Influence code is shown in Figure 1b.

Figure 1b.



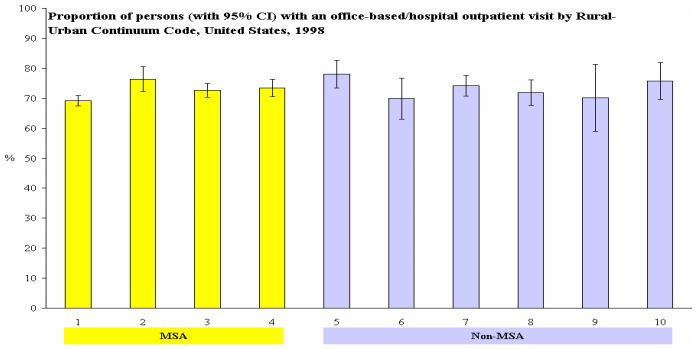
As with the Rural-Urban Continuum Code significant differences were observed when comparing the MSA subgroups to the non-MSA subgroups.

For example, large metro areas exhibited a significantly higher proportion than four of the seven non-MSA subgroup: consistent with what was observed when comparing simply MSA to non-MSA. Unlike when using the Rural-Urban Continuum Code, there was no detectable difference between the MSA subgroups.

Utilization

The estimated proportions of persons reporting to have had at least one office-based/hospital outpatient visit by geographic location are presented in Table 2. Non-MSAs demonstrated a slightly more than three percentage point greater proportion of persons with at least one office-based/hospital outpatient visit compared to non-MSAs (p=0.016). Figure 2a shows the variation in geographic subgroup estimates when stratifying by Urban-Rural Continuum Code.

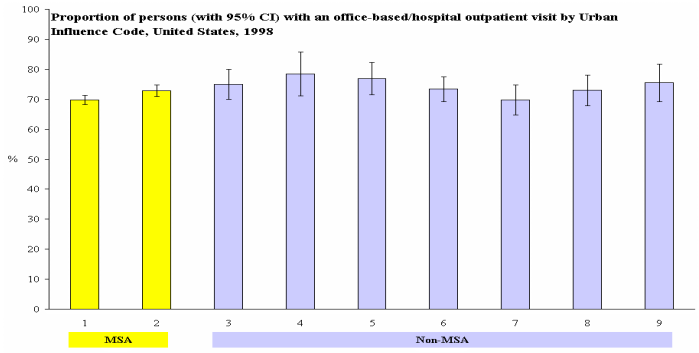
Figure 2a.



The overall association between geographic location and proportion of persons reporting a visit was statistically significant when using the Urban-Rural Continuum Code (p=0.003). The smallest and largest observed proportions were for metro central counties with a population of ≥1 million people (69.10%) and non-metro counties not adjacent to a metro area with an urban population of ≥20,000 (78.04%), respectively. As with the access to care measure, when stratifying by Urban-Rural Continuum Code there were detectable significant differences between subgroups both between and within MSA and non-MSA.

Figure 2b shows the variation in subgroup estimates when using the Urban Influence Codes. As with the Rural-Urban Continuum Codes the smallest proportion (69.66%) was observed for the largest metro counties (i.e., ≥1 million inhabitants). The characteristics of the region with the largest proportion (78.39%) changed slightly to non metro counties adjacent to a large metro area with no city with a population of ≥10,000 inhabitants. The overall association between geographic setting and the proportion with office-based/hospital outpatient visits was significant (p=0.017). Again, there were detectable significant differences between subgroups both between and within MSA and non-MSA when employing the Urban Influencing coding.

Figure 2b.

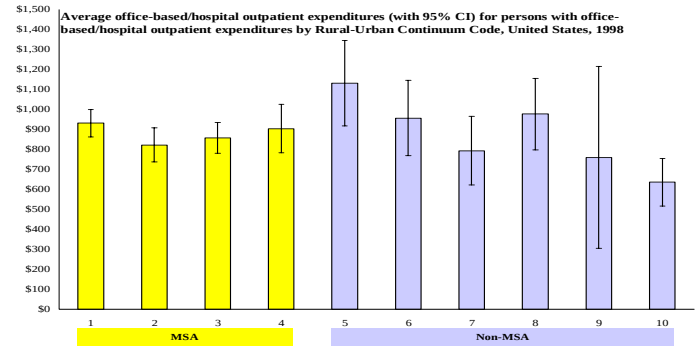


Expenditures

Average office-based/hospital outpatient expenditures for persons with office-based/hospital outpatient expenditures by geographic location are presented in Table 3. There was no detectable statistical difference between the average expenditures for MSAs compared to non-MSAs ($897 compared to $931).

When using the more detailed Rural-Urban Continuum Code, the effect of geographic locale on office-based/hospital outpatient expenditures was highly significant (p=0.0001). The variability in expenditures across geographic setting is illustrated in Figure 3a. Both the highest and lowest observed average expenditures were in non-MSA subgroups: the highest being $1,132 in non-metro counties adjacent to a metro area with an urban population of ≥20,000 people, the lowest being $636 in non-metro counties not adjacent to a metro area with no places with a population ≥2,500.

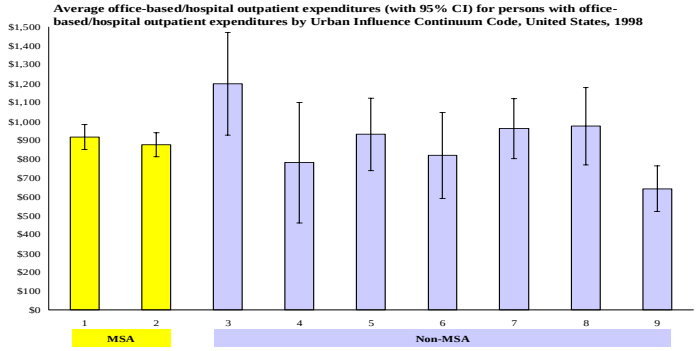
Figure 3a.



When using the Urban Influence code, the effect of geographic location on office-based/hospital outpatient expenditures remains significant (p=0.0006). Again, the highest and lowest average expenditures are observed for the largest and smallest non-MSA subgroups: non-metro counties adjacent to a large metro area with a city with a population of ≥10,000 ($1,200) and non-metro counties adjacent to a metro area with no city or a

city with a population of <2,500. Figure 3b demonstrates the variability of estimates stratified by the Urban Influence Code.

Figure 3b.



DISCUSSION

The results in this paper demonstrate the potential benefit of moving beyond the dichotomous MSA/non-MSA nomenclature typically used for analyzing disparities and supporting health policy related to healthcare disparities. When examining these selected healthcare measures (i.e., access to care, utilization, expenditures), there appears to be a significant amount of geographic variability that is masked when using a dichotomous indicator such as MSA/non-MSA and trying to contrast rural and urban areas.

For broad based population measures, such as those presented in this report, the MEPS sample sizes were sufficiently large to generate reliable estimates when a more detailed geographic continuum was used. However, when attempting to generate estimates of utilization intensity (i.e., frequency of events) and expenditure measures for less commonly occurring events (inpatient hospitalizations, data not shown), sample sizes quickly diminished across both the Rural-Urban Continuum Codes and the Urban Influence Codes. One potential remedy for this would be to (re)collapse the geographic indicators. Supplemental analyses demonstrated that the estimates and differences observed when contrasting estimates appear to be highly sensitive to even modest regrouping of these geographic indicators. For example, when using an alternative grouping for the Rural-Urban Continuum Code, the association between geographic location and the proportion reporting at least one office-based/hospital outpatient visit was no longer significant. Moreover, this remedy will not be sufficient for the level of detail to be included in the MEPS component of AHRQ's 2003 report on healthcare disparities primarily because the data do not provide sufficient sample size to cross-stratify either the Rural-Urban Continuum Code or the Urban Influence Code with the necessary socioeconomic characteristics (e.g., race/ethnicity, gender, household income, etc.).

Neither the Rural-Urban Continuum nor the Urban Influence codes support the identification of inner-city areas. Though the codes stratify urban areas according to size (i.e., population) they do not allow for a detailed taxonomy of urban characteristics which may affect the delivery and quality of healthcare resources within urban environments. It is presumed that there is variability in access to healthcare and utilization of healthcare resources within large urban centers, thus it would be advantageous to identify various levels of affluence across metropolitan areas which may affect these dimensions of healthcare. The current coding mechanisms are limited when considering that larger counties (particularly in the western United States) may have very large urban centers (i.e., big cities) which would lead the county to be classified as a metropolitan county yet have a subpopulation of people in a remote rural area whose experiences in obtaining healthcare may be more similar to others living in non-metropolitan areas.

CONCLUSIONS

In conclusion,

- The MEPS has a sufficiently large sample to generate estimates of broad based population measures across a more detailed geographic continuum than provided with the traditional MSA/Non-MSA stratification.
- As is common with many Federal data sources, the reliability of MEPS estimates for selected subpopulations (e.g., persons with inpatient hospital stays, black children in rural areas, etc.) may suffer from reduction in sample size.
- The sample size for the 2002 MEPS is a 50% increase over the 1998 MEPS. This increase should provide improvements in derived estimates (e.g., there is the potential to tighten the 1998 observed confidence intervals by a factor of 0.82.)
- Where there is sufficient sample size, significant variation in healthcare measures can be identified within both MSA and Non-MSA designated areas.
- Given the importance of evaluating healthcare disparities across geographic dimensions, further investigation into the feasibility of varying geographic identifiers within the MEPS is warranted (e.g., various collapsing strategies, more detailed multivariate analyses using Census block group level data to assist in identifying "inner-city" areas).

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Table 1. Proportion of persons reporting to have no usual source for healthcare by geographic locale, United States, 1998 MEPS

Geographic Characteristic			Sample Size	Population Estimate	%	S.E of the %	Statistically Significant Differences[1]
OMB							
MSA			17,700	216,291,037	18.88	0.60	Non-MSA
Non-MSA			4,786	51,836,211	14.72	0.87	MSA
Rural-Urban Continuum Codes							
MSA	1	Metro (central counties)/Population ≥1 million	10163	119,675,087	20.24	0.83	3, 5, 7, 10
	2	Metro (fringe counties)/Population ≥1 million	653	9,218,964	17.58	1.90	7, 10
	3	Metro counties/Population 250,000 - <1 million	5,391	68,856,276	16.67	1.23	1, 10
	4	Metro counties/Population <250,000	1,484	18,862,426	18.53	1.84	7, 10
Non-MSA	5	Non-Metro/Adjacent to a metro area/Urban population ≥20,000	802	8,837,267	13.13	2.67	1
	6	Non-Metro/Not adjacent to a metro area/Urban population ≥20,000	979	8,218,388	20.46	2.87	7, 10
	7	Non-Metro/Adjacent to a metro area/Urban population 2,500-19,999	1,363	15,361,622	12.28	1.97	1, 2, 4, 6
	8	Non-Metro/Not adjacent to a metro area/Urban population 2,500-19,999	1,150	13,219,012	16.94	1.82	10
	9	Non-Metro/Adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	150	1,795,006	15.30	2.94	
	10	Non-Metro/Not adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	370	4,169,446	9.94	2.79	1, 2, 3, 4, 6, 8
Urban Influence Codes							
MSA	1	Large Metro(central & fringe counties)/Population ≥1 million	10,979	131,095,259	19.81	0.81	4, 5, 6, 9
	2	Small Metro counties/Population <1 million	6,712	85,517,493	17.37	1.07	4, 5, 9
Non-MSA	3	Non-Metro/Adjacent to a large metro area/City with population ≥10,000	354	3,866,352	14.92	4.80*	
	4	Non-Metro/Adjacent to a large metro area/No city with population ≥10,000	159	1,951,334	9.42	1.93	1, 2, 7, 8
	5	Non-Metro/Adjacent to a small metro area/City with population ≥10,000	768	8,733,989	11.94	1.92	1, 2, 7
	6	Non-Metro/Adjacent to a small metro area/No city with population ≥10,000	1,033	11,431,394	13.28	2.31	1
	7	Non-Metro/Not adjacent to a metro area/City of population ≥10,000	1,259	11,496,318	19.69	2.31	9
	8	Non-Metro/Not adjacent to a metro area/City of population 2,500-9,999	878	9,994,974	16.84	2.43	4
	9	Non-Metro/Not adjacent to a metro area/No city OR city of population <2,500	363	4,126,381	9.43	2.79	1, 2, 7

[1]Comparisons performed within each geographic definition. All identified differences significant at the α=0.05 level or better.

*Relative Standard Error >30%

Table 2. Proportion of persons reporting at least one office-based/hospital outpatient visit by geographic locale, United States, 1998 MEPS

Geographic Characteristic			Sample Size	Population Estimate	%	S.E of the %	Statistically Significant Differences[1]
OMB							
MSA			17,897	218,775,471	70.92	0.60	Non-MSA
Non-MSA			4,817	52,217,481	74.09	1.14	MSA
Rural-Urban Continuum Codes							
MSA	1	Metro (central counties)/Population ≥1 million	10,378	122,264,009	69.10	0.87	2, 3, 5, 7, 10
	2	Metro (fringe counties)/Population ≥1 million	667	9,333,761	76.40	2.11	1
	3	Metro counties/Population 250,000 - <1 million	5,486	70,084,494	72.64	1.19	1, 5
	4	Metro counties/Population <250,000	1,510	19,220,441	73.41	1.44	1
Non-MSA	5	Non-Metro/Adjacent to a metro area/Urban population ≥20,000	817	8,987,590	78.04	2.33	1, 3, 6
	6	Non-Metro/Not adjacent to a metro area/Urban population ≥20,000	994	8,411,084	69.89	3.50	5
	7	Non-Metro/Adjacent to a metro area/Urban population 2,500-19,999	1,392	15,613,694	74.10	1.77	1
	8	Non-Metro/Not adjacent to a metro area/Urban population 2,500-19,999	1,173	13,500,905	71.88	2.17	
	9	Non-Metro/Adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	156	1,847,882	70.11	5.72	
	10	Non-Metro/Not adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	376	4,205,469	75.75	3.17	1
Urban Influence Codes							
MSA	1	Large Metro(central & fringe counties)/Population ≥1 million	11,209	133,809,398	69.66	0.79	2, 4, 5
	2	Small Metro counties/Population <1 million	6,832	87,093,307	72.81	0.98	1
Non-MSA	3	Non-Metro/Adjacent to a large metro area/City with population ≥10,000	361	3,913,980	74.91	2.57	
	4	Non-Metro/Adjacent to a large metro area/No city with population ≥10,000	162	1,986,245	78.39	3.75	1, 7
	5	Non-Metro/Adjacent to a small metro area/City with population ≥10,000	783	8,946,228	76.88	2.76	1, 7
	6	Non-Metro/Adjacent to a small metro area/No city with population ≥10,000	1,058	11,591,886	73.34	2.14	
	7	Non-Metro/Not adjacent to a metro area/City of population ≥10,000	1,279	11,764,332	69.68	2.57	4, 5
	8	Non-Metro/Not adjacent to a metro area/City of population 2,500-9,999	896	10,201,547	72.93	2.58	
	9	Non-Metro/Not adjacent to a metro area/No city OR city of population <2,500	369	4,162,404	75.50	3.20	

[1]Comparisons performed within each geographic definition. All identified differences significant at the α=0.05 level or better.

*Relative Standard Error >30%

Table 3. Average office-based/hospital outpatient expenditures for persons with office-based/hospital outpatient expenditures by geographic locale, United States, 1998 MEPS

Geographic Characteristic			Sample Size	Population Estimate	%	S.E of the %	Statistically Significant Differences[1]
OMB							
MSA			11,999	152,423,614	$897	$23	
Non-MSA			3,439	37,914,079	$931	$43	
Rural-Urban Continuum Codes							
MSA	1	Metro (central counties)/Population ≥1 million	6,736	82,803,102	$932	$35	2, 10
	2	Metro (fringe counties)/Population ≥1 million	487	7,027,673	$823	$43	1, 5, 10
	3	Metro counties/Population 250,000 - <1 million	3,794	50,148,504	$858	$39	5, 10
	4	Metro counties/Population <250,000	1,067	13,874,780	$904	$62	10
Non-MSA	5	Non-Metro/Adjacent to a metro area/Urban population ≥20,000	632	6,892,999	$1,132	$109	2, 3, 7, 10
	6	Non-Metro/Not adjacent to a metro area/Urban population ≥20,000	643	5,725,894	$958	$96	10
	7	Non-Metro/Adjacent to a metro area/Urban population 2,500-19,999	977	11,402,299	$794	$87	5
	8	Non-Metro/Not adjacent to a metro area/Urban population 2,500-19,999	836	9,496,830	$977	$92	10
	9	Non-Metro/Adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	112	1,291,940	$761	$232*	
	10	Non-Metro/Not adjacent to a metro area/No places with population ≥2,500 (Completely Rural)	268	3,072,286	$636	$61	1, 2, 3, 4, 5, 6, 8
Urban Influence Codes							
MSA	1	Large Metro(central & fringe counties)/Population ≥1 million	7,335	91,418,730	$917	$34	3, 9
	2	Small Metro counties/Population <1 million	4,749	62,435,329	$875	$32	3, 9
Non-MSA	3	Non-Metro/Adjacent to a large metro area/City with population ≥10,000	269	2,912,759	$1,200	$139	1, 2, 6, 9
	4	Non-Metro/Adjacent to a large metro area/No city with population ≥10,000	120	1,549,167	$781	$163	
	5	Non-Metro/Adjacent to a small metro area/City with population ≥10,000	593	6,746,203	$931	$98	9
	6	Non-Metro/Adjacent to a small metro area/No city with population ≥10,000	738	8,368,282	$819	$117	
	7	Non-Metro/Not adjacent to a metro area/City of population ≥10,000	832	7,964,908	$961	$81	9
	8	Non-Metro/Not adjacent to a metro area/City of population 2,500-9,999	654	7,305,178	$974	$104	9
	9	Non-Metro/Not adjacent to a metro area/No city OR city of population <2,500	262	3,035,751	$644	$62	1, 2, 3, 5, 7, 8

[1]Comparisons performed within each geographic definition. All identified differences significant at the α=0.05 level or better.

*Relative Standard Error >30%