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## Health Characteristics of Medicare Traditional Fee-for-Service and Medicare Advantage Enrollees: 1999–2004 National Health and Nutrition Examination Survey Linked to 2007 Medicare Data

by Lisa B. Mirel, M.S., Division of Health and Nutrition Examination Surveys; Gloria Wheatcroft, M.P.H., Jennifer D. Parker, Ph.D., and Diane M. Makuc, Dr. P.H., Office of Analysis and Epidemiology

### Abstract

*Background*—National Health and Nutrition Examination Survey (NHANES) records have been linked to health care use and expenditure information from Medicare records. Claims data are generally available only for traditional fee-for-service (FFS) enrollees and not for Medicare Advantage enrollees. Differences in health characteristics between Medicare Advantage and traditional FFS enrollees could affect conclusions from analyses of the linked files that are restricted to traditional FFS enrollees.

*Methods*—Data from the 1999–2004 NHANES linked to the 2007 Medicare enrollment data were analyzed. Using examination and interview data collected in NHANES, we compared health characteristics of Medicare beneficiaries aged 65 and over at the NHANES interview by their type of Medicare enrollment in 2007.

*Results*—We found that the overall percentage of Medicare beneficiaries who had hypertension at the time of the NHANES medical examination was lower for Medicare Advantage enrollees compared with traditional FFS enrollees; this was found for the non-Hispanic white population but not for other race and ethnicity groups. We found no statistically significant differences between Medicare Advantage and traditional FFS enrollees overall or within race and ethnicity groups for other health characteristics that were measured or reported at the time of the NHANES interview or medical examination in 1999–2004.

*Conclusions*—Despite finding no large differences in health characteristics by Medicare enrollment in this analysis, users of the National Center for Health Statistics Medicare linked files should consider potential differences in health characteristics between Medicare Advantage and traditional FFS enrollees that could influence results limited to traditional FFS beneficiaries only.

**Keywords:** data linkage • Centers for Medicare & Medicaid Services • national health survey

### Introduction

Managed care plans have been an option for Medicare beneficiaries since the early 1970s. Enrollment in managed care plans has fluctuated greatly, influenced by policy changes instituted by Congress. For example, before 1996 fewer than 10% of Medicare beneficiaries were enrolled in Medicare Advantage; this increased to 14% in 1997 and 20% in 2007 (1). Both the Balanced Budget Act of 1997 and the Medicare Modernization Act of 2003 led to sharp increases in the number of private plans offered and in the number of enrollees in Medicare Advantage plans. A 2010 report shows that Medicare beneficiaries enrolled in Medicare Advantage plans, also referred to as Managed Care Organization (MCO) or Medicare Part C plans, tend to differ from beneficiaries enrolled in traditional fee for service (FFS) by region and urbanicity (2). Other studies have compared quality of care (3,4), health care access (5,6), and health outcomes (7–9) between the programs. Some studies have indicated that Medicare beneficiaries who opt into Medicare Advantage plans are healthier than those who do not (10–12).



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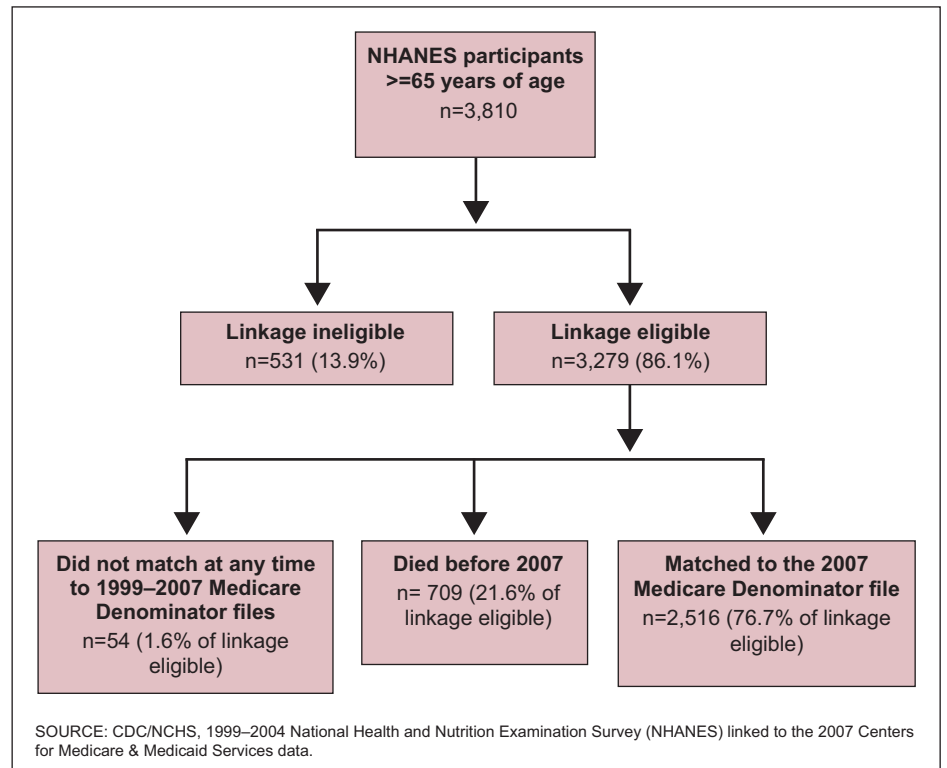


The National Center for Health Statistics' (NCHS) survey records have been linked to Medicare claims records in order to add a longitudinal component to the surveys and increase the research potential of NCHS' survey data. However, a potential limitation of these linked files is that the Centers for Medicare & Medicaid Services (CMS) receives Medicare claims records, which provide information about health care use and expenditures for beneficiaries enrolled in traditional FFS, but does not generally receive claims records for beneficiaries enrolled in Medicare Advantage plans. Consequently, analysts must decide how to handle periods of beneficiary enrollment in Medicare Advantage when analyzing NCHS survey data linked to Medicare claims, and generally restrict the analytic sample to traditional FFS beneficiaries with claims data during part or all of the analytic period. Differences in health and other characteristics between Medicare Advantage and traditional FFS enrollees could affect results and inferences from analyses that are restricted to traditional FFS beneficiaries.

This report compares demographic and health characteristics from the 1999–2004 National Health and Nutrition Examination Survey (NHANES) for Medicare Advantage and traditional FFS enrollees in 2007. To date, physical examination data have not been used to compare the health status of enrollees in Medicare Advantage plans and traditional FFS.

## Methods

We use the 1999–2004 NHANES data linked to the 2007 Medicare data. The only Medicare information used in this analysis is type of Medicare enrollment during 2007 from the Medicare Denominator file. There may have been up to 8 years or as few as 3 years between the time of exam or interview and the 2007 type of Medicare enrollment information. The NHANES data are currently linked to 1999–2007 Medicare data, and therefore Medicare Advantage enrollment can be assessed at multiple time points using the linked



**Figure 1. Analytic sample for NHANES 1999–2004 participants linked to the 2007 Medicare Denominator file**

data files. We focus on 2007 because it is currently the most recent year of Medicare data available on the linked file, emphasizes the longitudinal aspect of the linked data file, and provides sufficient numbers of observations for the analysis. In addition, the Medicare Advantage program in earlier years differs from the program in 2007, thus, incentives to enroll in Medicare Advantage in 2007 may differ from incentives in earlier years (13).

The analytic sample includes linkage eligible 1999–2004 NHANES respondents who were aged 65 and over at interview, were examined, alive on January 1 2007, and matched to the 2007 Medicare Denominator file. Information about vital status of NHANES respondents was obtained using the linked 1999–2004 NHANES Linked Mortality files (14) and those who died in the interval from the baseline NHANES interview to December 31, 2006, were excluded from this analysis (n=709).

Briefly, linkage eligibility means that the survey respondent provided sufficient personally identifiable information (PII) or did not refuse to

provide their Social Security number (SSN) or Health Insurance Claim number during the NHANES interview, thus, allowing their records to be linked (15). Because not all NHANES respondents are linkage eligible, these files have an additional layer of “non-response” from the survey.

Some participants who were alive on January 1, 2007, and linkage eligible did not match at any time to the CMS files (n=54). This could be because they did not match exactly on date of birth, SSN, or sex. The final analytic sample had 2,516 participants (Figure 1).

An NHANES participant was classified as enrolled in a Medicare Advantage plan if he or she had at least 1 month of managed care enrollment in 2007. As a sensitivity analysis, we recalculated the percentage enrolled in Medicare Advantage after defining Medicare Advantage enrollment as enrollment as of December 31, 2007, for comparability with a 2009 ResDac report (16).

The health outcomes based on NHANES examination data are: hypertension, hypercholesterolemia, and obesity. The health outcomes based on NHANES interview data are: self-

reported health status, and ever diagnosed diabetes, coronary heart disease, and cancer. The estimated prevalence of these health outcomes is shown overall and by type of Medicare enrollment. Because health outcomes and Medicare enrollment are known to vary by race and ethnicity, additional estimates are provided for the three race and ethnicity groups, non-Hispanic white, non-Hispanic black, and Mexican American.

Statistical analyses were conducted using the SAS System for Windows (release 9.2; SAS Institute Inc., Cary, N.C.) and SUDAAN (release 10.0; Research Triangle Institute, Research Triangle Park, N.C.). All analyses included sample examination weights from NHANES that accounted for the unequal probabilities of selection and nonresponse. The statistical weights were further adjusted for linkage “non-response”; this included adjusting for 1999–2004 NHANES respondents who could not be linked, who had died in the interval, or did not have data on the 2007 Medicare Denominator file (17). All estimates incorporated the

adjusted sample weights and variance calculations accounted for the complex sample design of the survey, using Taylor series linearization. All significance tests were evaluated using a two-sided  $p$ -value  $<0.05$  as the level of statistical significance. Unless otherwise specified, statements such as “less likely” or “more likely” are based on statistical significance tests using a Chi-square distribution. Estimates presented have a relative standard error less than or equal to 30% and greater than or equal to 12 degrees of freedom, unless otherwise noted. No estimates for the Mexican-American population enrolled in Medicare Advantage met both of these criteria. In the figures and tables, unknown values (responses coded as “refused” or “don’t know”) were not counted in the denominators when calculating estimates.

For more information on NHANES and definition of terms see the “Technical Notes” section.

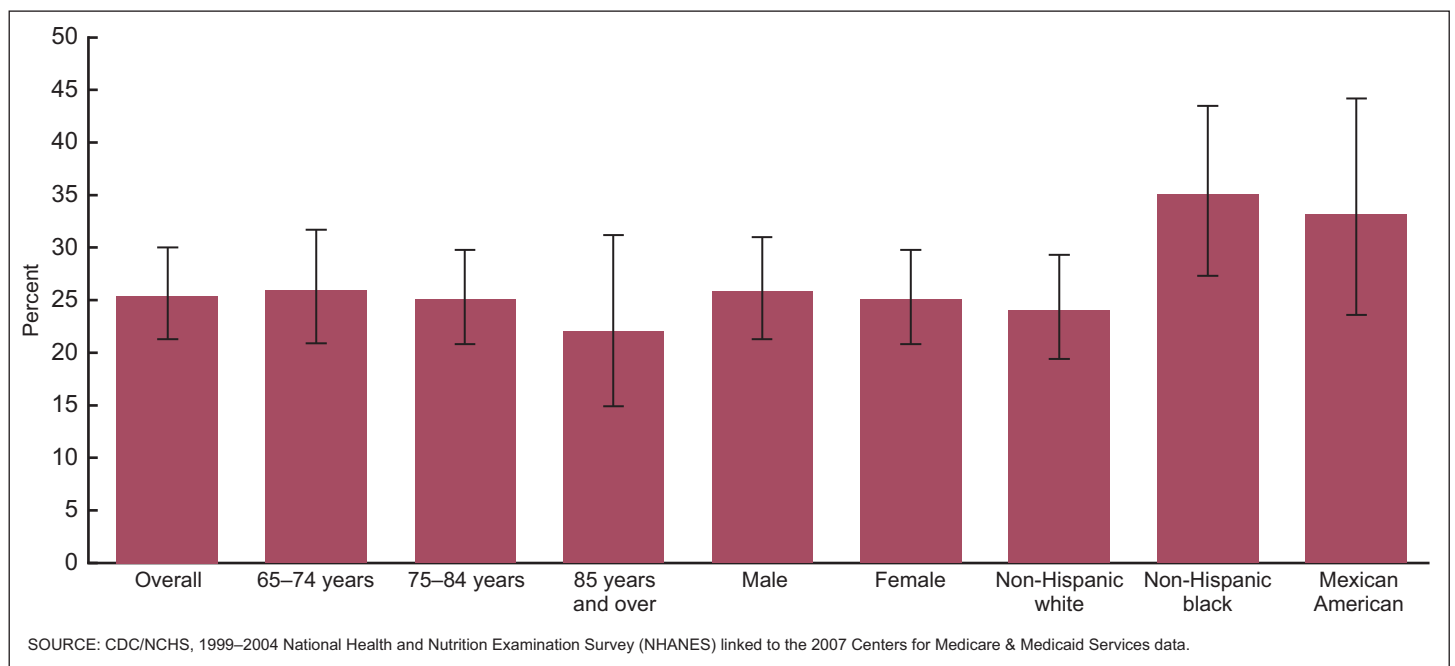
## Results

### Medicare Advantage plan enrollment in 2007

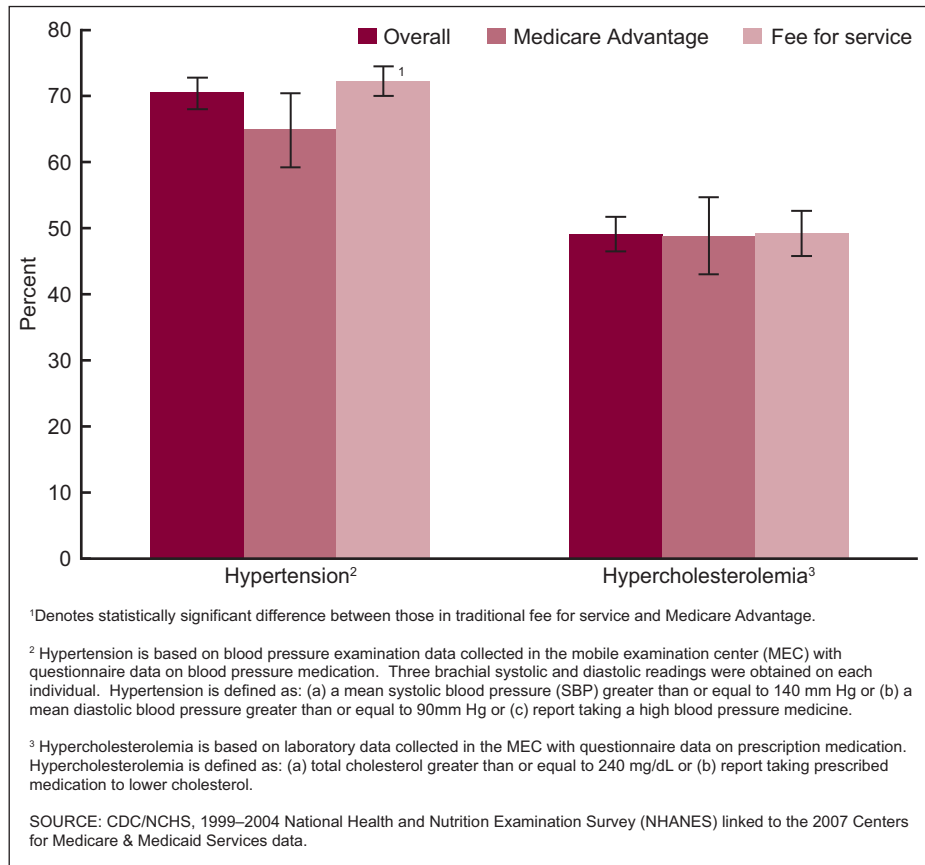
- An estimated 25% of Medicare beneficiaries aged 65 and over at the time of their NHANES interview were enrolled in a Medicare Advantage plan for 1 or more months in 2007 (Table 1, Figure 2).
- There were no differences in the percentage with Medicare Advantage plan enrollment by age or sex.
- Non-Hispanic white beneficiaries were less likely (24%) to be enrolled in a Medicare Advantage plan than non-Hispanic black (35%) and Mexican-American (33%) beneficiaries.

### Hypertension and hypercholesterolemia by type of Medicare enrollment

- Overall, about 70% of Medicare beneficiaries aged 65 and over in NHANES had hypertension. The percentage with hypertension was



**Figure 2. Percentage enrolled in a Medicare Advantage plan in 2007, among Medicare beneficiaries aged 65 and over at NHANES interview, by demographic characteristics: 1999–2004 NHANES linked to the 2007 Medicare data**

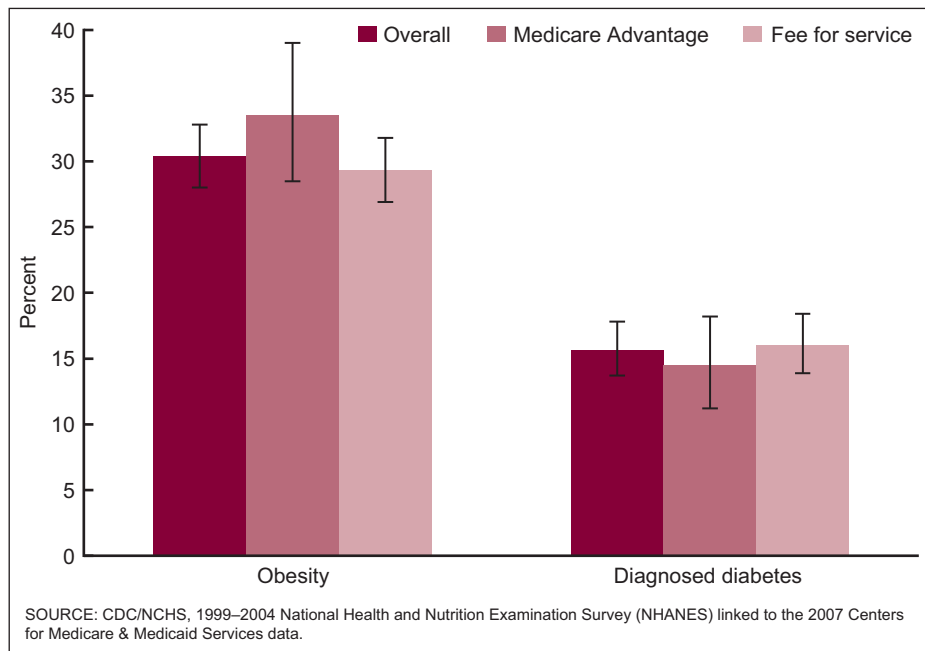


**Figure 3. Hypertension and hypercholesterolemia among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007**

higher for traditional FFS enrollees (72%) compared with Medicare Advantage enrollees (65%) (Figure 3).

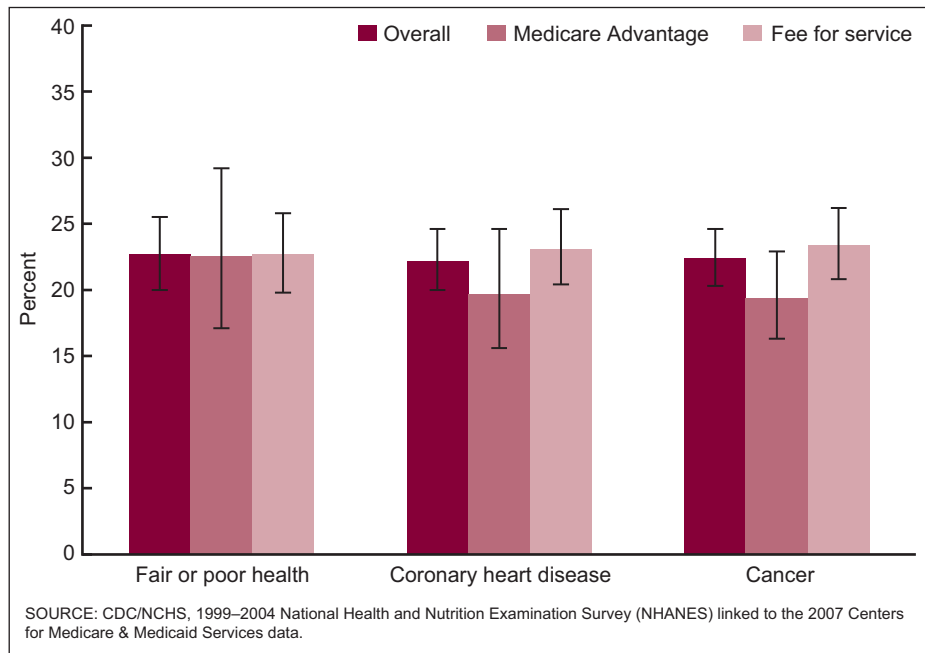
- Among non-Hispanic white beneficiaries, the percentage who had hypertension was higher for traditional FFS enrollees (72%) compared with Medicare Advantage enrollees (63%). For non-Hispanic black and Mexican-American beneficiaries, the percentage who had hypertension was not significantly different for traditional FFS and Medicare Advantage enrollees (Table 2).
- The estimated percentage of Medicare beneficiaries from NHANES who had hypercholesterolemia was 49%. The percentage with hypercholesterolemia was similar for Medicare Advantage and traditional FFS enrollees (Figure 3).
- Within each race and ethnicity group, the percentage of beneficiaries with hypercholesterolemia was not significantly different for Medicare Advantage and traditional FFS enrollees (Table 3).

### Obesity and diagnosed diabetes by type of Medicare plan enrollment



**Figure 4. Obesity and diagnosed diabetes among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007**

- Overall, about one-third of Medicare beneficiaries aged 65 and over in NHANES were obese. The percentage who were obese as measured in NHANES was not significantly different for Medicare Advantage and traditional FFS enrollees in 2007 (Figure 4).
- Similarly, within each race and ethnicity group, the percentage of beneficiaries who were obese was not significantly different for Medicare Advantage and traditional FFS enrollees (Table 4).
- Overall, 16% of Medicare beneficiaries aged 65 and over in NHANES had diagnosed diabetes. The percentage with diagnosed diabetes did not differ significantly between Medicare Advantage and traditional FFS enrollees overall, or within each race and ethnicity group (Table 5).



**Figure 5. Fair or poor self-reported health status, coronary heart disease, and cancer among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007**

## Self-reported health status, coronary heart disease, and cancer by type of Medicare enrollment

- Overall, about 23% of Medicare beneficiaries aged 65 and over in NHANES reported having fair or poor health status. The percentage who reported fair or poor health status was not significantly different between Medicare Advantage and traditional FFS enrollees overall, or within race and ethnicity groups (Figure 5, Table 6).
- The percentage of Medicare beneficiaries aged 65 and over in NHANES who had ever been diagnosed with coronary heart disease was 22%. The percentage of Medicare beneficiaries who had coronary heart disease did not differ significantly between Medicare Advantage and traditional FFS enrollees overall, or within race and ethnicity groups (Table 7).
- Overall, 22% of Medicare beneficiaries aged 65 and over in NHANES had ever been diagnosed with cancer. The percentage of Medicare beneficiaries who had ever been diagnosed with cancer did not

differ significantly between Medicare Advantage and traditional FFS enrollees overall, or within race and ethnicity groups (Table 8).

## Discussion

Our analysis using the linked 1999–2004 NHANES and 2007 Medicare data, showed an estimated 25% of Medicare beneficiaries from NHANES were enrolled in a Medicare Advantage plan in 2007. With respect to the specific health characteristics measured in the 1999–2004 NHANES that we examined in this report, there was little difference between beneficiaries enrolled in Medicare Advantage and traditional FFS enrollees in 2007. We found that the percentage of Medicare beneficiaries who had hypertension at the time of the NHANES medical examination was lower for Medicare Advantage enrollees compared with traditional FFS enrollees in 2007. However, this was not the case for other health characteristics; the percentage of beneficiaries with hypercholesterolemia, obesity, diagnosed diabetes, self-report of fair or poor health, diagnosed coronary heart disease, and diagnosed cancer did not differ

significantly between Medicare Advantage and traditional FFS enrollees in 2007. Furthermore, we found that among non-Hispanic white beneficiaries, the percentage who had hypertension was lower for Medicare Advantage enrollees compared with traditional FFS enrollees, however, there were no other statistically significant differences in health characteristics by type of Medicare enrollment within race and ethnicity groups.

Some previous studies have found differences between Medicare Advantage and traditional FFS enrollees in mortality or self-reported health status (10,18). However, we found no statistically significant difference in self-reported health status between Medicare Advantage and traditional FFS enrollees aged 65 and over. We focused on common health risk factors and conditions, three of which were measured at the mobile examination center (MEC). In addition to focusing on some measures that have not previously been compared, possible reasons for our different findings could be due to the design of the NHANES, which samples noninstitutionalized residents and requires an examination in the MEC, random variation as measured by the 95% confidence intervals (CI), and the time gap between the measurement of health characteristics and Medicare enrollment. An additional factor that may play a role could be the definition of Medicare Advantage enrollment. Our estimate of beneficiaries enrolled in Medicare Advantage in 2007 (25%, 95% CI from 21% to 29.6%) is slightly higher than other published reports, including a 2009 report which estimated that about 20% of all Medicare beneficiaries were enrolled in a Medicare Advantage plan on December 31, 2007 (16). Our definition of enrollment classified an NHANES participant as enrolled in a Medicare Advantage plan if he or she had at least 1 month of managed care enrollment in the benefit year 2007 rather than enrolled on December 31, 2007. Based on the sensitivity analysis we conducted using enrollment on December 31, 2007, the percentage and 95% CI of beneficiaries enrolled in a Medicare

Advantage plan was 22.9% (95% CI from 19.3% to 27.0%). Using this alternative definition, comparisons of health characteristics by type of Medicare enrollment were similar to those presented in the tables and figures.

In addition, we found no statistically significant differences in plan enrollment in 2007 by age at interview or sex. However, similar to previous studies, we did note differences in plan enrollment by race and ethnicity (12). These differences in enrollment between race and ethnicity groups may be a result, in part, of differences in market penetration of Medicare Advantage plans in urban and rural areas (19). According to a *Kaiser Family Foundation Medicare Issue Brief*, “at the end of 2007, 22 percent of all Medicare beneficiaries in urban counties were enrolled in Medicare Advantage, as opposed to only 10 percent of beneficiaries in rural counties” (19).

Due to statistical power limitations, this analysis could not assess whether the comparisons between Medicare Advantage and traditional FFS enrollees differ after further stratification by region, age, or other factors, or whether the comparisons of diabetes prevalence would be affected by inclusion of those with undiagnosed diabetes based on the morning fasting subsample as measured at the NHANES medical examination. An additional limitation of this study is the time gap between the NHANES interview or medical examination and the administrative record. It is possible that health characteristics in 2007 might have been different than those measured in NHANES in 1999–2004.

Although this analysis found no large differences in health characteristics by Medicare enrollment, users of the NHANES and Medicare linked data should still consider possible implications of the lack of Medicare claims data for Medicare Advantage enrollees for their specific research question in deciding how to treat periods of Medicare Advantage enrollment in their analysis and how to interpret results. One analytic approach is to include Medicare Advantage enrollees for the time period prior to

entering Medicare Advantage and censor them at the time that they enter Medicare Advantage (20). Analyses, using the NCHS survey—Medicare linked files, have handled Medicare Advantage enrollment in different ways. Looker et al. utilized the NHANES III data linked to Medicare claims and mortality to estimate the risk of incident hip fracture in adults aged 65 and over. They excluded NHANES III survey respondents if they were enrolled in a Medicare managed care plan at the time of their baseline examination in NHANES III (21). This approach resulted in the exclusion of 167 people out of the 4,092 adults who were aged 65 and over. In another analysis Decker et al. utilized the 1994–2005 National Health Interview Survey (NHIS) linked to Medicare claims data to study health service use among individuals who were uninsured before age 65. They excluded respondents if they were not in traditional FFS Medicare for at least 1 year before entering a managed care plan. This resulted in excluding 719 individuals out of 6,139 who were alive and eligible for Medicare Part A from the 1994–2005 NHIS (22).

Exclusion of Medicare Advantage enrollees may affect inferences and conclusions drawn about the health or health care utilization patterns of Medicare beneficiaries that are necessarily restricted to beneficiaries enrolled in traditional FFS. Researchers need to be clear that the analyses apply to traditional FFS beneficiaries as has been done for other studies based on Medicare claims data (23). Although inferences are generalizable to the traditional FFS group, it may not be appropriate to draw conclusions about all Medicare beneficiaries.

To facilitate determining how to handle Medicare Advantage enrollment in their studies, NCHS has provided researchers with tables showing the unweighted percentage of survey participants who were linked to the different years of the Medicare Denominator file and were enrolled in Medicare Advantage by age at interview (24). These tables can be used to estimate the impact of Medicare Advantage enrollees on analytic sample

sizes. Future research based on the NHIS linked Medicare files will compare self-reported health characteristics of Medicare Advantage with traditional FFS beneficiaries. The larger sample size of the NHIS will enable additional comparisons to be made including a comparison of health characteristics by type of Medicare enrollment at the time of Medicare enrollment.

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**Table 1. Percent distribution and percentage enrolled in a Medicare Advantage plan in 2007, among Medicare beneficiaries aged 65 and over at NHANES interview, by demographic characteristics: 1999–2004 NHANES linked to the 2007 Medicare data**

Demographic characteristic	n	Percent distribution (95% confidence interval)	Percent in Medicare Advantage (95% confidence interval)
All . . . . .	2,516	100.0	25.4 (21.3–30.0)
Age (years)			
65–74 . . . . .	1,413	60.6 (57.4–63.6)	25.9 (20.9–31.7)
75–84 . . . . .	896	33.5 (31.0–36.1)	25.1 (20.8–29.8)
85+ . . . . .	207	6.0 (5.0–7.1)	22.0 (14.9–31.2)
Sex			
Male . . . . .	1,211	42.7 (40.6–44.7)	25.9 (21.3–31.0)
Female . . . . .	1,305	57.3 (55.3–59.4)	25.1 (20.8–29.8)
Race and ethnicity			
Non-Hispanic white . . . . .	1,568	88.7 (85.4–91.3)	24.0 (19.4–29.3)
Non-Hispanic black . . . . .	321	8.3 (6.2–10.9)	35.0 (27.3–43.5)
Mexican American . . . . .	493	3.0 (1.7–5.4)	33.1 (23.6–44.2)

NOTES: n is unweighted sample size. Percent is weighted percentage. Race and ethnicity excludes other Hispanic and other race (including multiracial) while all other demographic characteristics include all race and ethnic groups.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 2. Percentage who had hypertension among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
All race and ethnicities <sup>§,1</sup>			
Overall . . . . .	2,450	70.5	68.0–72.8
Medicare Advantage . . . . .	708	65.0	59.2–70.4
Traditional FFS . . . . .	1,742	72.3	70.0–74.5
Non-Hispanic white <sup>§</sup>			
Overall . . . . .	1,532	69.2	66.1–72.2
Medicare Advantage . . . . .	387	62.7	56.3–68.7
Traditional FFS . . . . .	1,145	71.2	68.2–74.1
Non-Hispanic black			
Overall . . . . .	312	84.2	78.6–88.6
Medicare Advantage . . . . .	107	84.3	74.1–91.0
Traditional FFS . . . . .	205	84.2	76.2–89.8
Mexican American			
Overall . . . . .	476	68.7	62.8–74.0
Medicare Advantage <sup>2</sup> . . . . .	171	64.4	55.5–72.4
Traditional FFS . . . . .	305	70.8	63.4–77.2

<sup>§</sup> Denotes statistically significant difference between those in traditional fee for service (FFS) and Medicare Advantage.

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.



**Table 3. Percentage who had hypercholesterolemia among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
<b>All race and ethnicities<sup>1</sup></b>			
Overall . . . . .	2,075	49.1	46.5–51.7
Medicare Advantage . . . . .	603	48.8	43.0–54.7
Traditional FFS . . . . .	1,472	49.2	45.8–52.6
<b>Non-Hispanic white</b>			
Overall . . . . .	1,382	49.9	47.0–52.7
Medicare Advantage . . . . .	346	49.5	43.1–56.0
Traditional FFS . . . . .	1,036	50.0	46.3–53.7
<b>Non-Hispanic black</b>			
Overall . . . . .	226	43.9	36.6–51.7
Medicare Advantage <sup>2</sup> . . . . .	84	49.2	38.0–60.4
Traditional FFS . . . . .	142	40.8	32.2–49.9
<b>Mexican American</b>			
Overall . . . . .	362	41.6	35.9–47.6
Medicare Advantage <sup>2</sup> . . . . .	138	44.3	35.2–53.8
Traditional FFS <sup>2</sup> . . . . .	224	40.2	33.8–46.9

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 4. Percentage who were obese among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
<b>All race and ethnicities<sup>1</sup></b>			
Overall . . . . .	2,376	30.4	28.0–32.8
Medicare Advantage . . . . .	704	33.5	28.5–39.0
Traditional FFS . . . . .	1,672	29.3	26.9–31.8
<b>Non-Hispanic white</b>			
Overall . . . . .	1,479	29.6	26.8–32.5
Medicare Advantage . . . . .	382	33.4	27.0–40.5
Traditional FFS . . . . .	1,097	28.3	25.5–31.3
<b>Non-Hispanic black</b>			
Overall . . . . .	298	45.0	38.6–51.6
Medicare Advantage . . . . .	109	36.5	26.5–47.8
Traditional FFS . . . . .	189	49.9	42.6–57.1
<b>Mexican American</b>			
Overall . . . . .	474	32.0	27.1–37.2
Medicare Advantage <sup>2</sup> . . . . .	171	30.8	24.4–38.2
Traditional FFS . . . . .	303	32.5	26.7–38.9

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 5. Percentage who had diagnosed diabetes among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
All race and ethnicities <sup>1</sup>			
Overall . . . . .	2,515	15.6	13.7–17.8
Medicare Advantage . . . . .	735	14.5	11.4–18.2
Traditional FFS . . . . .	1,780	16.0	13.9–18.4
Non-Hispanic white			
Overall . . . . .	1567	14.5	12.2–17.0
Medicare Advantage . . . . .	400	12.8	9.6–17.0
Traditional FFS . . . . .	1,167	15.0	12.6–17.7
Non-Hispanic black			
Overall . . . . .	321	22.0	17.9–26.6
Medicare Advantage . . . . .	113	22.9	16.2–31.4
Traditional FFS . . . . .	208	21.4	16.5–27.4
Mexican American			
Overall . . . . .	493	25.0	21.4–29.0
Medicare Advantage <sup>2</sup> . . . . .	178	21.0	15.7–27.6
Traditional FFS . . . . .	315	26.9	20.7–34.3

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 6. Percentage with fair or poor self-reported health status among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
All race and ethnicities <sup>1</sup>			
Overall . . . . .	2,406	22.7	20.0–25.5
Medicare Advantage . . . . .	703	22.6	17.1–29.2
Traditional FFS . . . . .	1,703	22.7	19.8–25.8
Non-Hispanic white			
Overall . . . . .	1517	19.2	16.3–22.4
Medicare Advantage . . . . .	393	17.7	12.7–24.3
Traditional FFS . . . . .	1,124	19.6	16.4–23.3
Non-Hispanic black			
Overall . . . . .	298	37.5	32.4–43.0
Medicare Advantage <sup>2</sup> . . . . .	102	41.9	31.9–52.6
Traditional FFS . . . . .	196	35.3	27.6–43.8
Mexican American			
Overall . . . . .	468	47.3	42.7–51.9
Medicare Advantage <sup>2</sup> . . . . .	168	41.9	32.2–52.1
Traditional FFS . . . . .	300	49.9	44.7–55.2

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 7. Percentage who had ever been diagnosed with coronary heart disease among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
All race and ethnicities <sup>1</sup>			
Overall . . . . .	2,516	22.2	20.0–24.6
Medicare Advantage . . . . .	736	19.7	15.6–24.6
Traditional FFS . . . . .	1,780	23.1	20.4–26.1
Non-Hispanic white			
Overall . . . . .	1,568	22.8	20.2–25.7
Medicare Advantage . . . . .	401	20.5	15.6–26.5
Traditional FFS . . . . .	1,167	23.6	20.5–27.0
Non-Hispanic black			
Overall . . . . .	321	18.7	15.5–22.4
Medicare Advantage . . . . .	113	18.2	11.4–27.8
Traditional FFS . . . . .	208	19.0	14.8–24.1
Mexican American			
Overall . . . . .	493	15.8	12.6–19.7
Medicare Advantage <sup>2</sup> . . . . .	178	17.5	12.1–24.6
Traditional FFS . . . . .	315	15.0	11.7–19.2

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

**Table 8. Percentage who had ever been diagnosed with cancer among Medicare beneficiaries aged 65 and over at NHANES interview, by type of Medicare enrollment in 2007 and race and ethnicity**

Race and ethnicity and type of Medicare enrollment	n	Percent	95% confidence interval
All race and ethnicities <sup>1</sup>			
Overall . . . . .	2,512	22.4	20.3–24.6
Medicare Advantage . . . . .	736	19.4	16.3–22.9
Traditional FFS . . . . .	1,776	23.4	20.8–26.2
Non-Hispanic white			
Overall . . . . .	1,566	24.7	22.3–27.2
Medicare Advantage . . . . .	401	22.3	18.7–26.4
Traditional FFS . . . . .	1,165	25.4	22.5–28.6
Non-Hispanic black			
Overall . . . . .	320	9.5	6.6–13.7
Medicare Advantage . . . . .	113	10.4	5.8–18.2
Traditional FFS . . . . .	207	9.0	5.8–13.9
Mexican American			
Overall . . . . .	492	7.2	5.3–9.9
Medicare Advantage <sup>2</sup> . . . . .	178	9.0	4.6–16.9
Traditional FFS . . . . .	314	6.4	4.8–8.5

<sup>1</sup>All race and ethnicities include other Hispanic and those who identified as other race and ethnicity, including multiracial.

<sup>2</sup>Indicates estimate is based on less than 12 degrees of freedom or relative standard error is greater than or equal to 30% but less than 40%.

NOTES: n is unweighted sample size for type of plan. Percent is weighted percentage in the plan with the health condition. FFS is fee for service.

SOURCE: CDC/NCHS, 1999–2004 National Health and Nutrition Examination Survey (NHANES) linked to the 2007 Centers for Medicare & Medicaid Services data.

## Technical Notes

### Data source

Currently NHANES is a continuous survey (1999–present) that includes an interview in the household followed by a physical examination in a mobile examination center (MEC). NHANES is a representative cross-sectional sample of the U.S. civilian, noninstitutionalized population that is selected using a complex, multistage probability design. Detailed descriptions of the NHANES sample design are available elsewhere (25). The unweighted response rates for the 1999–2004 NHANES interview and examination were 81.7% and 77.2%, respectively. The CMS Medicare Denominator file (or Beneficiary Summary file) provides data on all Medicare beneficiaries enrolled or entitled to Medicare benefits in a given year. Monthly information on the enrollment status of Medicare beneficiaries including third party payer information and managed care organization plan enrollment information is provided.

The linkage of NHANES to CMS Medicare data was undertaken to support various research initiatives. NHANES respondents were eligible for linkage to CMS Medicare administrative records if they 1) provided sufficient personally identifiable information, 2) did not refuse to provide their SSN or Health Insurance Claim number at the time of the NHANES interview, and they 3) had a SSN verified by the Social Security Administration Enumeration Verification System (17). There were 31,126 NHANES participants in 1999–2004 and about 83% (n=25,750) were linkage eligible (17).

### Definition of terms

*Medicare Advantage plans*—are also referred to as Managed Care Organization (MCO) or Part C plans. Medicare Advantage enrollment is defined using the Health Maintenance Organization (HMO) indicator in the Medicare Denominator file. The HMO indicator refers to some type of managed care enrollment, including cost

based and risk based plans. For this analysis, the sample participant from NHANES was classified as enrolled in a Medicare Advantage plan if he or she had at least 1 month of managed care enrollment in the benefit year of 2007. All Medicare beneficiaries who did not meet the criteria for Medicare Advantage plan enrollees were classified as traditional fee-for-service (FFS) enrollees.

*Hypertension*—is based on blood pressure examination data collected in the MEC with questionnaire data on blood pressure medication. Three brachial systolic and diastolic readings were obtained on each individual. Hypertension is defined as: (a) a mean systolic blood pressure (SBP) greater than or equal to 140 mm Hg, (b) a mean diastolic blood pressure greater than or equal to 90 mm Hg, or (c) report taking a high blood pressure medicine.

*Hypercholesterolemia*—is based on laboratory data collected in the MEC with questionnaire data on prescription medication. Hypercholesterolemia is defined as: (a) total cholesterol greater than or equal to 240 mg/dL or (b) report taking prescribed medication to lower cholesterol.

*Obesity*—is calculated from physical examination data collected in the MEC as weight in kilograms divided by height in meters squared, body mass index (BMI). BMI category greater than or equal to 30 was defined as obese (26).

*Diagnosed diabetes*—is based on a positive response to the following question: “{Other than during pregnancy, {have you}}{Have you}} ever been told by a doctor or health professional that{you have} diabetes or sugar diabetes?”

*Self-reported fair or poor health*—is based on the NHANES questionnaire data. The respondent is asked to classify their health as excellent, very good, good, fair, or poor. In 1999–2000 this question was asked as part of the “Hospital Utilization and Access to Care” section of the household interview. In 2002–2004 this question was asked as part of the current health status questions collected at the MEC.

*Diagnosed coronary heart disease*—is based on the NHANES Medical Conditions, Cardiovascular Disease and Prescription Medications questionnaire. Diagnosed coronary heart disease is defined as: (a) ever told that had congestive heart failure or (b) ever told that had coronary heart disease or (c) ever told that had heart attack or myocardial infarction or (d) ever told that had angina or (e) Rose questionnaire grade I angina (27) or (f) took anti-angina medication in the last 30 days. Note: The Rose questionnaire was not asked in 1999–2000 but has been included in the definition for participants from the NHANES 2001–2004. In addition, because diagnosed congestive heart failure is included, this may be a slight overestimate of diagnosed coronary heart disease.

*Diagnosed cancer*—is based on self-report from the medical conditions questionnaire data, and defined as a positive response to the following question: “[Have you] ever been told by a doctor or other health professional that had cancer or a malignancy of any kind?”

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HEALTH & HUMAN SERVICES**

Centers for Disease Control and Prevention  
National Center for Health Statistics  
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**National Center for Health Statistics**

Edward J. Sondik, Ph.D., *Director*  
Jennifer H. Madans, Ph.D., *Associate Director  
for Science*

**Division of Health and Nutrition  
Examination Surveys**

Clifford L. Johnson, M.S.P.H., *Director*

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