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Historical Trend of Racial and Ethnic Disparities in Meeting Medicare Medication Therapy Management Eligibility Criteria in Non-Medicare Population

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Abstract

Background—Prior research examining racial and ethnic disparities in meeting Medicare medication therapy management (MTM) eligibility criteria among the non-Medicare population suggests minorities have lower likelihood of being eligible than non-Hispanic Whites (Whites). However, such research has not examined trends in disparities and whether these disparities may be expected to decrease over time based on historical data.

Objectives—To examine trends in MTM eligibility disparities among the non-Medicare population from 1996-1997 to 2009-2010.

Methods—This retrospective observational analysis used Medical Expenditure Panel Survey data from the study periods. The MTM eligibility criteria used by health insurance plans in 2008 and 2010 were analyzed. Trends in disparities were examined by including interaction terms between dummy variables for 2009-2010 and non-Hispanic Blacks (Blacks)/Hispanics in a logistic regression. The effect of interaction was estimated on both the multiplicative and additive terms. Main and sensitivity analyses were conducted to represent the ranges of the Medicare MTM eligibility thresholds used by health insurance plans.

Results—According to the main analysis, Blacks and Hispanics were less likely to be eligible than Whites for both sets of eligibility criteria in 1996-1997 and in 2009-2010. Trend analysis for both sets of criteria found that on the multiplicative term, there were generally no significant

changes in disparities between Whites and Blacks/Hispanics from 1996-1997 to 2009-2010. Interaction on the additive term found evidence that disparities between Whites and Blacks/Hispanics may have increased from 1996-1997 to 2009-2010 (e.g., in the main analysis between Whites and Hispanics for 2010 eligibility criteria: difference in odds= -0.03, 95% CI: [-0.03]-[-0.02]).

Conclusions—Racial and ethnic minorities in the non-Medicare population experience persistent and often increasing disparities in meeting MTM eligibility criteria. Drug benefit plans should take caution when using elements of Medicare MTM eligibility criteria.

Keywords

Non-Medicare; Medicare; medication therapy management services; eligibility; disparities

Introduction

Since 2002, the Agency for Healthcare Research and Quality (AHRQ) National Health Disparities Reports have documented the status and quality of health care received across race and ethnicity.¹ These reports and other studies have demonstrated that minorities are more likely to receive poor quality of care and have poor access to preventive care, acute treatment, and chronic disease management in comparison to non-Hispanic Whites (referred to hereafter as ‘Whites’).¹⁻⁴ A recent study found that eliminating racial and ethnic disparities would have reduced \$229.4 billion in direct medical costs in the United States in 2003-2006. Additionally it was found that during this period, 30.6% of direct medical expenditures for racial and ethnic minorities including non-Hispanic Blacks (referred to hereafter as ‘Blacks’) and Hispanics came from additional costs due to health inequalities.⁵ Realizing the necessity of reducing disparities, the U.S. Department of Health and Human Services (HHS) has taken steps to address this issue. One of its most prominent initiatives, *Healthy People 2020*, has reduction of disparities as one of its major goals.⁶

In 2006, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) established Medicare outpatient prescription drug (Part D) benefits and required Medicare Part D plans to establish programs to provide medication therapy management (MTM) services for high risk beneficiaries.⁷ MTM services are comprised of actively managing drug therapy and identifying, preventing and resolving issues related to medications.⁸ Medicare Part D plans are required to establish eligibility criteria for MTM services based on using multiple Part D drugs, having multiple chronic conditions, and incurring drug costs that exceed a certain threshold.⁷ To be eligible for MTM services, each individual has to meet all three criteria.⁷ Before 2010, Part D plans used eligibility thresholds between 2 to 15 Part D drugs, 2 to 5 chronic conditions, and drug costs of at least \$4,000.^{7,9} In 2010, the Centers for Medicare & Medicaid Services (CMS) lowered the maximum MTM eligibility thresholds to 8 Part D drugs, 3 chronic conditions, and drug costs of at least \$3,000.¹⁰

MTM services have also been adopted by many non-Medicare drug benefit plans, demonstrating positive outcomes in eligible beneficiaries.¹¹⁻¹⁴ These programs have incorporated features of the Part D MTM eligibility framework, such as number of medications and number of chronic conditions, to identify high risk beneficiaries.¹¹⁻¹⁴ For

example, the Minnesota Medicaid program provides MTM services to those beneficiaries who take 4 or more prescription medications to treat 2 or more chronic conditions. This program is beneficial for those who qualify; for example, 36% of MTM recipients with diabetes achieved optimal care as compared to the statewide average of 6%.¹⁴

Despite historical improvement in overall health in the U.S population, minorities are more likely than Whites to have poor health status and chronic conditions, such as diabetes and hypertension.^{15,16} Minorities would thus likely benefit considerably from MTM services; however, they face greater obstacles to accessing MTM than Whites. Studies have found that racial and ethnic minorities use fewer medications and incur lower drug costs than Whites.^{1,17,18} Since eligibility for MTM services is based predominantly on health care utilization (i.e., medication costs), this may negatively affect minorities. A previous study of racial and ethnic disparities in meeting Medicare MTM eligibility in the non-Medicare population found that minorities had lower likelihood of being eligible than Whites in 2007-2008.¹⁹ The specific objective of this study was to examine trends in MTM eligibility disparities among the non-Medicare population from 1996-1997 to 2009-2010. If the MTM eligibility criteria historically did not perform better over time in eligibility disparities, this may suggest that these criteria may not perform better in the future, which would provide added urgency for modifying the current MTM eligibility criteria.

Methods

This is a retrospective observational analysis of the non-Medicare population in the Medical Expenditure Panel Survey (MEPS) data from two 2-year study periods, 1996-1997 and 2009-2010.²⁰ MEPS is nationally representative of noninstitutionalized U.S. civilians and provides annual estimates of health care use, expenditures, sources of payment, health insurance coverage, health status, and sociodemographic characteristics. Years 1996 and 1997 are the earliest years when MEPS data are available and the period of 2009-2010 was the most current at the time of this analysis.

Data Sources

The Full-Year Consolidated Data File, the Prescribed Medicines File, and the Medical Conditions Files from the MEPS household survey were used. The Full-Year Consolidated Data File provides information on sociodemographic characteristics, geographic location, health status and health care expenditures. The Prescribed Medicines file and Medical Conditions file provide information on annual household-reported prescribed medicines and medical conditions, respectively. The advantage of using MEPS data is that it oversamples Blacks and Hispanics to produce reliable estimates in these minority populations. This study used combined data from 1996-1997 and 2009-2010 to represent the two study periods. The pooled data provides adequate statistical power, and the MEPS panel design permits longitudinal estimates over two consecutive years.²⁰ To be included, non-Medicare patients had to be at least 18 years old and self-reported as White, Black or Hispanic. Other racial and ethnic groups were not analyzed due to small sample counts.

Study Variables

The outcome variables examined were meeting the 2008 and 2010 MTM eligibility criteria. The 2008 criteria represent the earliest time period when CMS published the MTM eligibility thresholds used by Part D plans and the 2010 criteria represent the most current at the time of the analyses.¹⁰ Employing both sets of criteria in the analysis allows assessment of whether the lower 2010 eligibility thresholds were still associated with disparities in qualifying for MTM. The wide variation in eligibility thresholds for the numbers of Part D drugs and chronic conditions were accounted for by considering the lower limit, median, and upper limit values. For the 2008 criteria, the lower, median, and upper limit values for Part D drugs were 2, 5, and 15, respectively. The lower, median and upper limit values for chronic conditions for the 2008 criteria were 2, 3, and 5, respectively. These thresholds were combined with the single drug cost threshold of \$4,000, resulting in 9 unique combinations ($3 \times 3 \times 1$) to be examined for the 2008 criteria. For the main analysis of the 2008 criteria, the median values for number of Part D drugs (i.e., 5) and number of chronic conditions (i.e., 3), and the cost threshold of \$4,000 were considered. The remaining 8 combinations were incorporated into sensitivity analyses. The findings from the main analysis were given greater weight because the most popular MTM eligibility thresholds were analyzed in the main analysis. To determine cost for 1996-1997, the 2008 cost threshold of \$4,000 was converted to 1996 and 1997 dollars using the consumer price index for medical care.²¹ For 2009-2010, the 2008 cost threshold of \$4,000 was converted to 2010 dollars for 2010; the drug cost threshold in 2009 was also \$4,000.

Based on the 2010 MTM eligibility criteria, 6 unique combinations of the eligibility thresholds were examined ($3 \times 2 \times 1$). The lower, median and upper limit values for the number of Part D drugs were 2, 5, and 8, respectively, for the 2010 eligibility criteria. The lower and upper limit values for the number of chronic conditions were 2 and 3, respectively, for the 2010 eligibility criteria. These thresholds were combined with the drug cost threshold of \$3,000. For the main analysis of the 2010 criteria, the median value for number of Part D drugs (i.e., 5), upper value for number of chronic conditions (i.e., 3), and cost threshold of \$3,000 were considered. The remaining 5 unique combinations were incorporated into sensitivity analyses. To determine cost for 1996-1997, the 2010 cost threshold of \$3,000 was converted to 1996 and 1997 dollars using the consumer price index for medical care.²¹ For 2009-2010, the 2010 cost threshold of \$3,000 was converted to 2009 dollars for 2009 but remained the same for 2010.

Twenty-five chronic conditions were considered based on the list developed by Daniel and Malone for Medicare beneficiaries.²² This list is applicable to the non-Medicare population since it includes all main chronic conditions for which MTM services are provided to this population.¹⁰⁻¹⁴ These conditions were selected based on clinical classification codes in the database.²⁰

The study used Andersen's Behavioral Model of Health Services Utilization in selecting its independent variables.²³ This model defines the utilization of health services as a function of: (1) predisposing, (2) enabling, and (3) need factors.²³ Predisposing factors refer to the individual's characteristics that are present before the illness, including demographic characteristics, social structure characteristics, and health beliefs. Enabling characteristics

refer to community and personal resources, and need characteristics refer to a patient's need to seek health care services. Predisposing characteristics included in this study were age, gender, race/ethnicity and marital status. Race/ethnicity was the main independent variable. The enabling characteristics included were insurance, income, education, geographic region and metropolitan statistical area. The need characteristic included was self-perceived health status.

Statistical Analysis

Descriptive statistics were calculated to compare patient characteristics across racial and ethnic groups for the two study periods. Wald Chi-square tests were used for these comparisons. Analyses were conducted to examine racial and ethnic disparities in meeting the 2008 and 2010 MTM eligibility criteria in each separate study period, 1996-1997 and 2009-2010. Wald Chi-square analyses were used to compare the proportion of individuals eligible for MTM across racial and ethnic groups. Comparisons were made between Whites and Blacks and between Whites and Hispanics. Additionally, an adjusted multivariate logistic regression analysis was conducted to assess the association between race/ethnicity and meeting MTM eligibility criteria after controlling for other predisposing, enabling, and need factors.

Data from the 1996-1997 and 2009-2010 periods were then combined to examine trends of racial and ethnic disparities in meeting 2008 and 2010 MTM eligibility criteria. A dummy variable for year was created where '1' represented 2009-2010 and '0' represented 1996-1997. The effect of interaction between year and race/ethnicity was estimated at both the multiplicative and additive levels. Interpretation on the multiplicative term takes into account the baseline effect in each group compared. Interpretation on the additive term, also known as "marginal effect," takes into account only the baseline effect in the reference group.²⁴ For the multiplicative term, a positive interaction term between racial/ethnic group and study period 2009-2010 and a p value <0.05 would indicate a decrease in disparities among minorities compared to Whites. On the additive term, a positive and significant difference in marginal effects between racial/ethnic groups across time periods would indicate a decrease in disparities.

Statistical analyses were conducted using SAS 9.3 (SAS Institute Inc., Cary, North Carolina) and STATA 12.0 (StataCorp LP, College Station, TX). The complex design of the MEPS survey was accounted for in all analyses. The statistical significance level was set *a priori* at 0.05. The study was approved by the Institutional Review Board at the lead author's institution.

Results

The 2009-2010 study sample consisted of 26,408 (weighted to 258,641,952) non-Medicare individuals aged 18 or older. Of these, 12,433 were White [weighted to 181,875,265 (70.32%)], 5,618 were Black [weighted to 33,247,865 (12.85%)] and 8,357 were Hispanic [weighted to 43,518,823 (16.83%)]. The 1996-1997 study sample included 18,976 (weighted to 173,110,490) non-Medicare individuals aged 18 or older. Of these, 12,249 were White [weighted to 132,401,125 (76.48%)], 2,599 were Black [weighted to 21,364,987 (12.34%)],

and 4,128 were Hispanic [weighted to 19,344,378 (11.17%)]. Differences between Whites and racial and ethnic minorities for both study periods were significant across all patient characteristics ($p<0.05$; Table 1).

Bivariate analysis for 1996-1997 found that higher proportions of Whites than minorities met the 2008 and 2010 criteria for Part D drugs ($p<0.05$), chronic conditions ($p<0.05$, except for comparison between Blacks and Whites for 5 or more chronic conditions), and drug costs ($p<0.05$; results not shown). Similar patterns were found for 2009-2010, where higher proportions of Whites than minorities met the 2008 and 2010 criteria for Part D drugs ($p<0.05$, except for comparison between Blacks and Whites for number of drugs > 15), chronic conditions ($p<0.05$), and drug costs ($p<0.05$; results not shown).

The study compared the proportion of non-Medicare population meeting each of the 9 unique combinations of 2008 MTM eligibility criteria across racial and ethnic groups in the 1996-1997 sample. Higher proportions of Whites were eligible than Blacks and Hispanics ($p<0.05$), with the exception of sensitivity analyses 6, 7, and 8 (Table 2). According to the main analysis in the adjusted multivariate model, Blacks were less likely to be eligible than Whites (odds ratio [OR]: 0.26, 95% confidence interval [CI]: 0.13-0.55), while Hispanics were equally likely to be eligible (OR: 0.54, 95% CI: 0.28-1.03). Refer to Figure 1A for adjusted odds ratios for the sensitivity analyses.

In comparing the proportion meeting each of the 6 unique combinations of 2010 MTM eligibility criteria in the 1996-1997 sample, higher proportions of Whites were eligible than Blacks and Hispanics ($p<0.05$; Table 3). According to the main analysis after adjusting for other patient characteristics, Blacks (OR: 0.40, 95% CI: 0.24-0.69) and Hispanics (OR: 0.53, 95% CI: 0.30-0.94) were less likely to be eligible than Whites. Refer to Figure 1B for adjusted odds ratios for the sensitivity analyses.

In comparing the proportion meeting each of the 9 unique combinations of 2008 criteria in the 2009-2010 sample, higher proportions of Whites were eligible than Blacks and Hispanics ($p<0.05$; Table 2). However, differences between Whites and Blacks were not significant for sensitivity analyses 6, 7, and 8. According to the main analysis after adjusting for other patient characteristics, Blacks (OR: 0.63, 95% CI: 0.48-0.83) and Hispanics (OR: 0.51, 95% CI: 0.36-0.73) were less likely to be eligible than Whites. Refer to Figure 1C for adjusted odds ratios for the sensitivity analyses.

In comparing the proportion meeting each of the 6 unique combinations of 2010 criteria in the 2009-2010 sample, higher proportions of Whites were eligible than Blacks and Hispanics ($p<0.05$; Table 3). According to the main analysis after adjusting for other patient characteristics, Blacks (OR: 0.59, 95% CI: 0.47-0.75) and Hispanics (OR: 0.52, 95% CI: 0.39-0.71) were less likely to be eligible than Whites. Refer to Figure 1D for adjusted odds ratios for the sensitivity analyses.

The trends in racial and ethnic disparities in meeting the 2008 and 2010 MTM eligibility criteria were examined by combining data from 1996-1997 and 2009-2010. For the 2008 criteria, according to the adjusted multivariate regression in the main analysis, on the multiplicative term the interaction between Blacks and 2009-2010 was not significant (OR:

2.04, 95% CI: 0.995-4.20; Table 4). Sensitivity analyses had similar findings, except the interaction between Blacks and 2009-2010 was significant in sensitivity analyses 6-8 (OR and 95% CI: >1000), suggesting a decrease in disparities from 1996-1997 to 2009-2010. On the additive term, the marginal effects for Whites and Blacks were 0.007 and 0.003, respectively, in 1996-1997 and 0.034 and 0.025, respectively, in 2009-2010. Therefore, the difference in marginal effects between Whites and Blacks was 0.005 (not 0.004 due to rounding; $p<0.001$) in 1996-1997 and 0.009 ($p=0.007$) in 2009-2010. The difference in these differences was -0.004 (95% CI: [-0.01]-[0.003]; Table 5), suggesting the interaction between Blacks and 2009-2010 was not significant on the additive term in the main analysis. However, it was significant in sensitivity analysis 4 (difference in odds: [-0.01], 95% CI: [-0.02]-[-0.002], suggesting higher disparities in 2009-2010 than 1996-1997; results not shown in tables). Sensitivity analyses 6-8 did not produce results due to too few individuals eligible for MTM.

The interaction between Hispanics and the study period 2009-2010 was also not significant on the multiplicative term in the main analysis for the 2008 criteria (OR: 1.02, 95% CI: 0.53-1.95, Table 4). Sensitivity analyses had similar findings. On the additive term, the difference in marginal effects for Whites and Hispanics was lower in 1996-1997 than 2009-2010 in the main analysis (difference in odds: [-0.02], 95% CI: [-0.02]-[-0.01]; Table 5), indicating an increase in the disparity between Whites and Hispanics from 1996-1997 to 2009-2010. Sensitivity analyses had similar findings (results not shown in tables).

For the 2010 MTM eligibility criteria, the adjusted multivariate main analysis found that at the multiplicative level, the interactions between each of the racial and ethnic groups and the study period 2009-2010 were not significant (Table 4). Sensitivity analyses had similar findings. On the additive term, the difference in marginal effects for Whites and Blacks was similar in 1996-1997 to 2009-2010 in the main analysis (difference in odds: [-0.01], 95% CI: [-0.02]-[-0.00002]; Table 5). Sensitivity analyses 1-3 had significant findings with similar patterns (e.g., in sensitivity analysis 1, difference in odds: [-0.01], 95% CI: [-0.02]-[-0.002]), indicating an increase in the disparity between Whites and Hispanics from 1996-1997 to 2009-2010 (results not shown in tables). On the additive term, the difference in marginal effects for Whites and Hispanics was also lower in 1996-1997 than 2009-2010 in the main analysis (difference in odds: [-0.03], 95% CI: [-0.03]-[-0.02]; Table 5). All sensitivity analyses had similar findings (results not shown in tables).

Discussion

Analysis of the nationally representative non-Medicare population revealed that racial and ethnic minorities were less likely to meet the 2008 and 2010 MTM eligibility criteria than Whites in the study periods 1996-1997 and 2009-2010. Furthermore, this study found evidence that disparities between Whites and Blacks/Hispanics did not decrease from 1996-1997 to 2009-2010 for the 2008 and 2010 eligibility criteria. (The limited evidence that Blacks experienced fewer disparities in 2009-2010 should be interpreted with caution because it only holds true occasionally in the analyses.) This is consistent with previous studies of Medicare and non-Medicare populations, which have noted that minorities have lower likelihood of being MTM eligible than Whites.^{9,19} Disparities in MTM eligibility may

be due to lower rates of drug utilization and lower costs incurred by minorities compared to Whites.^{17,18} Although minorities generally have poorer health status than Whites,^{15,16} the current study found that Whites were more likely to meet eligibility thresholds for number of chronic conditions than minorities. This finding may be due to lower rates of diagnosis in minorities compared to Whites,¹ providing further evidence that minorities face greater barriers to health care access than Whites.

MTM eligibility disparities in the non-Medicare population is a major concern, since MTM programs have resulted in positive clinical and economic outcomes.^{13,14,25-27} For example, the Medicaid MTM program in Connecticut resulted in savings of \$1,123 per patient on medication costs, and \$472 per patient on medical and hospital costs.¹³ MTM programs have also demonstrated positive outcomes for eligible beneficiaries in the private sector. For example, the Asheville project aimed to assess clinical, humanistic, and economic outcomes of a community-based MTM program for adult asthma patients who had self-insured employers' health plans.^{25,26} The program resulted in significant clinical improvements, with significant decreases in overall costs.²⁵ As MTM services have the potential to improve outcomes among enrollees, it is imperative that racial and ethnic minorities gain increased access to these critical services.

The “iron triangle” in health care is a concept which describes the relationship between three important components: efficiency, equity, and cost.^{28,29} Efficiency refers to generating incentives to reduce costs and improve quality, while equity refers to access by need and not ability to pay.²⁹ In the current financial era, health care resources are limited and allocation is a concern. To achieve health gains at low cost, greater importance has been given to economic efficiency at the expense of equity, to the detriment of racial and ethnic minorities. As MTM disparities may lead to poor quality and increased costs, efficiency may suffer as well. The findings from this study provide evidence for policy makers to design MTM eligibility criteria with greater emphasis on equity, which may bring the iron triangle toward equilibrium.

Understanding the importance of equity, various policy initiatives have sought to improve health care access among racial and ethnic minorities. The Centers for Disease Control and Prevention has formed the Office of Minority Health and Health Equity, which aims to eliminate health disparities in vulnerable populations including racial and ethnic minorities.³⁰ Similarly, AHRQ has provided grants to nine “excellence centers to eliminate ethnic/racial disparities,” each of which is responsible for examining a different subject matter to determine and eliminate causes of disparities.³¹ Further, the Affordable Care Act requires improvement in the collection and reporting of data on racial and ethnic minorities.³² These national initiatives may reduce or eliminate racial and ethnic disparities in the future.

Although this study provided insights into trends in disparities in MTM eligibility, the findings have limitations. First, based on the information on drugs, chronic conditions, and costs in the MEPS database, policy scenarios were analyzed rather than implemented policies. Information on actual patient-level enrollment is currently not available to the research community; however, findings from this study could assist policy makers in

designing and amending policies that demonstrate a balance between efficiency, equity, and costs. Second, this study applied Medicare MTM eligibility criteria to the non-Medicare population rather than analyzing actual eligibility criteria for this population. However, non-Medicare plans design their MTM eligibility based on similar criteria. Third, eligibility criteria were determined on the basis of all prescription medications and not covered medications. However, this would not significantly change the results, as studies have shown that minorities utilize fewer medications than Whites in the overall population.^{1,17,18}

Conclusions

Study findings demonstrate that racial and ethnic minorities in the non-Medicare population would experience persistent and often increasing disparities in meeting Medicare MTM eligibility criteria. Such disparities may not be reduced or eliminated if utilization-based eligibility criteria are not addressed. Non-Medicare drug benefit plans should consider other strategies to determine MTM eligibility for plan enrollees. Future studies should examine actual enrollment data from Medicaid and private insurance plans to evaluate racial and ethnic disparities in meeting MTM eligibility.

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1A. Meeting 2008 MTM Eligibility Criteria in 1996-1997

* $p < 0.05$ for the difference between Whites and Blacks or between Whites and Hispanics.

Note: number of Blacks eligible for MTM for the sensitivity analyses 6, 7 and 8 is 0.

Main analysis: ≥ 5 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 1: ≥ 5 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 2: ≥ 5 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 3: ≥ 2 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 4: ≥ 2 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 5: ≥ 2 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 6: ≥ 15 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 7: ≥ 15 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 8: ≥ 15 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

1B. Meeting 2010 MTM Eligibility Criteria in 1996-1997

* $p < 0.05$ for the difference between Whites and Blacks or between Whites and Hispanics.

Main analysis: ≥ 5 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 1: ≥ 5 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 2: ≥ 2 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 3: ≥ 2 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 4: ≥ 8 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 5: ≥ 8 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

1C. Meeting 2008 MTM eligibility Criteria in 2009-2010

* $p < 0.05$ for the difference between Whites and Blacks or between Whites and Hispanics.

Main analysis: ≥ 5 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 1: ≥ 5 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 2: ≥ 5 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 3: ≥ 2 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 4: ≥ 2 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 5: ≥ 2 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 6: ≥ 15 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 7: ≥ 15 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$4,000$

Sensitivity analysis 8: ≥ 15 Part D drugs, ≥ 5 chronic conditions, drug costs $\geq \$4,000$

1D. Meeting 2010 MTM Eligibility Criteria in 2009-2010

* $p < 0.05$ for the difference between Whites and Blacks or between Whites and Hispanics.

Main analysis: ≥ 5 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 1: ≥ 5 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 2: ≥ 2 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 3: ≥ 2 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 4: ≥ 8 Part D drugs, ≥ 3 chronic conditions, drug costs $\geq \$3,000$

Sensitivity analysis 5: ≥ 8 Part D drugs, ≥ 2 chronic conditions, drug costs $\geq \$3,000$

Figure 1. Adjusted Odds Ratios for Meeting MTM Eligibility Criteria Based on Main and Sensitivity Analyses

Sociodemographic Characteristics across Racial and Ethnic Groups among the Non-Medicare Population in 1996-1997 and 2009-2010

Table 1

Characteristics	Groups	Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics	
		Frequency	%	Frequency	%	Frequency	%
1996-1997							
Age <i>a b</i>	18-30	3,059	26.98	834	33.73	1,538	39.64
	31-40	3,123	25.85	718	27.87	1,174	27.73
	41-50	3,148	24.94	601	23.32	789	18.33
	>50	2,919	22.23	446	15.08	627	14.30
Gender <i>a, b</i>	Female	6,320	50.48	1,538	54.57	2,209	47.68
	Male	5,929	49.52	1,061	45.43	1,919	52.32
Marital Status <i>a, b</i>	Not married	4,418	38.22	1,612	64.21	1,701	44.32
	Married	7,830	61.78	987	35.79	2,427	55.68
Insurance <i>a, b</i>	Any private	10,041	84.48	1,616	64.57	2,038	53.42
	Public only	657	3.90	451	13.67	599	11.64
	No insurance	1,551	11.62	532	21.76	1,491	34.94
Poverty <i>a, b</i>	Poor	1,002	7.09	648	19.33	1,069	20.80
	Near poor	429	2.58	139	5.14	282	7.70
	Low income	1,299	9.80	420	16.47	935	21.12
	Middle income	4,044	32.58	770	34.66	1,225	32.09
	High income	5,375	47.96	622	24.41	617	18.29
Highest Degree <i>a, b</i>	Lower than high school	1,882	12.97	633	21.77	2,080	45.50
	High School	6,387	52.06	1,461	58.00	1,521	39.18
	Bachelor	2,134	19.35	258	10.45	296	9.47
	Master and higher	1,013	8.56	113	4.56	89	2.22
Region <i>a, b</i>	Other	831	7.06	133	5.22	141	3.63
	Northeast	2,572	20.78	512	17.95	649	16.93
	Midwest	3,346	26.84	528	18.51	240	7.18
	South	4,036	33.19	1,331	54.78	1,442	33.00
	West	2,295	19.20	228	8.77	1,797	42.89

Characteristics	Groups	Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics	
		Frequency	%	Frequency	%	Frequency	%
Metropolitan Statistical Area ^{a,b}	No	3,200	21.15	399	14.35	482	8.28
	Yes	9,049	78.85	2,200	85.65	3,646	91.72
Self-perceived Health Status ^{a,b}	Excellent	3,789	32.66	701	30.10	1,092	28.98
	Very Good	4,269	35.95	746	29.35	1,283	31.06
	Good	2,994	23.36	779	28.52	1,195	27.80
	Fair	871	6.21	291	9.34	456	9.95
	Poor	311	1.83	74	2.69	92	2.21
2009-2010							
Age ^{a,b}	18-30	3,262	27.49	1,838	34.30	2,937	37.03
	31-40	2,538	19.02	1,143	20.90	2,110	25.05
	41-50	2,841	22.69	1,252	21.39	1,868	21.46
	>50	3,792	30.80	1,385	23.41	1,442	16.47
Gender ^{a,b}	Female	6,425	50.40	3,294	54.31	4,390	47.69
	Male	6,008	49.60	2,324	45.69	3,967	52.31
Marital Status ^{a,b}	Not married	5,235	42.55	3,793	66.31	4,068	51.31
	Married	7,198	57.45	1,825	33.69	4,289	48.69
Insurance ^{a,b}	Any private	9,551	80.45	3,163	59.83	3,380	45.78
	Public only	928	5.71	1,163	18.27	1,341	13.22
	No insurance	1,954	13.84	1,292	21.90	3,636	41.00
Poverty ^{a,b}	Poor	1,408	9.14	1,427	22.14	2,089	21.05
	Near poor	442	2.57	346	5.53	654	6.50
	Low income	1,448	10.16	974	15.94	1,797	20.70
Highest Degree ^{a,b}	Middle income	3,938	30.15	1,687	30.32	2,624	31.64
	High income	5,197	47.98	1,184	26.06	1,193	20.11
	Lower than high school	1,849	12.92	1,329	21.56	3,987	41.52
	High School	5,618	44.77	2,964	52.71	3,139	40.58
	Bachelor	2,533	21.83	594	12.43	594	9.36
	Master and higher	1,231	10.85	254	5.51	180	3.14
	Other	1,162	9.64	433	7.79	369	5.40

Characteristics	Groups	Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics	
		Frequency	%	Frequency	%	Frequency	%
Region ^{a,b}	Northeast	1,976	19.33	972	16.84	1,195	14.28
	Midwest	3,595	26.56	947	17.68	807	7.91
	South	4,253	33.78	3,257	56.80	2,786	36.34
	West	2,609	20.33	442	8.67	3,569	41.48
Metropolitan Statistical Area ^{a,b}	No	2,229	18.82	663	9.38	618	6.78
	Yes	10,204	81.18	4,955	90.62	7,739	93.22
Self-perceived Health Status ^{a,b}	Excellent	3,464	28.62	1,444	27.23	1,983	25.43
	Very Good	4,394	36.35	1,706	30.00	2,487	31.00
	Good	3,337	25.96	1,729	29.55	2,760	31.00
	Fair	905	6.81	587	9.97	956	10.71
	Poor	316	2.27	141	2.24	165	1.86

^a $p < 0.05$ for the difference between non-Hispanic Whites (Whites) and non-Hispanic Blacks (Blacks).

^b $p < 0.05$ for the difference between Whites and Hispanics.

Table 2
Proportions of Individuals across Racial and Ethnic Groups Eligible for MTM Services in 1996-1997 and 2009-2010 according to 2008 Criteria

Analyses	Number of Part D Drugs	Number of Chronic Conditions	Groups	Number Eligible	Number Eligible Weighted	Proportion Eligible (%)
1996-1997						
Main Analysis ^{1a,b}	5	3	Whites	113	1,001,279	0.76
			Blacks	10	50,525	0.24
			Hispanics	20	72,273	0.37
Sensitivity Analysis 1 ^{a,b}	5	2	Whites	137	1,222,659	0.92
			Blacks	15	84,467	0.40
			Hispanics	21	76,874	0.40
Sensitivity Analysis 2 ^{a,b}	5	5	Whites	70	625,560	0.47
			Blacks	4	22,291	0.10
			Hispanics	11	30,949	0.16
Sensitivity Analysis 3 ^{a,b}	2	3	Whites	116	1,055,259	0.80
			Blacks	11	56,724	0.27
			Hispanics	21	73,543	0.38
Sensitivity Analysis 4 ^{a,b}	2	2	Whites	145	1,351,362	1.02
			Blacks	16	90,666	0.42
			Hispanics	22	78,144	0.40
Sensitivity Analysis 5 ^{a,b}	2	5	Whites	70	625,560	0.47
			Blacks	4	22,291	0.10
			Hispanics	12	32,219	0.17
Sensitivity Analysis 6	15	3	Whites	48	386,311	0.29
			Blacks	0	0	0.00
			Hispanics	10	40,068	0.21
Sensitivity Analysis 7	15	2	Whites	54	431,739	0.33
			Blacks	0	0	0.00
			Hispanics	10	40,068	0.21
Sensitivity Analysis 8	15	5	Whites	40	307,804	0.23
			Blacks	0	0	0.00

Analyses	Number of Part D Drugs	Number of Chronic Conditions	Groups	Number Eligible	Number Eligible Weighted	Proportion Eligible (%)
2009-2010			Hispanics	6	19582	0.10
Main Analysis ^{a,b}	5	3	Whites	409	5,889,969	3.24
			Blacks	133	726,587	2.19
			Hispanics	111	568,617	1.31
Sensitivity Analysis 1 ^{a,b}	5	2	Whites	453	6,616,148	3.64
			Blacks	144	812,897	2.45
			Hispanics	118	616,214	1.42
Sensitivity Analysis 2 ^{a,b}	5	5	Whites	264	3,753,933	2.06
			Blacks	82	435,109	1.31
			Hispanics	67	339,957	0.78
Sensitivity Analysis 3 ^{a,b}	2	3	Whites	439	6,371,644	3.50
			Blacks	139	760,059	2.29
			Hispanics	120	617,446	1.42
Sensitivity Analysis 4 ^{a,b}	2	2	Whites	515	7,657,086	4.21
			Blacks	158	894,492	2.69
			Hispanics	135	746,690	1.72
Sensitivity Analysis 5 ^{a,b}	2	5	Whites	271	3,862,688	2.12
			Blacks	85	455,037	1.37
			Hispanics	67	339,957	0.78
Sensitivity Analysis 6 ^b	15	3	Whites	97	1,297,750	0.71
			Blacks	40	205,419	0.62
			Hispanics	20	94,915	0.22
Sensitivity Analysis 7 ^b	15	2	Whites	97	1,297,750	0.71
			Blacks	40	205,419	0.62
			Hispanics	21	102,250	0.24
Sensitivity Analysis 8 ^b	15	5	Whites	90	1,175,125	0.65
			Blacks	31	161,020	0.48
			Hispanics	19	91,685	0.21

^a $p < 0.05$ for the difference between Whites and Blacks.

$p < 0.05$ for the difference between Whites and Hispanics.

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Table 3
Proportions of Individuals across Racial and Ethnic Groups Eligible for MTM Services in 1996-1997 and 2009-2010 according to 2010 Criteria

Analyses	Number of Part D Drugs	Number of Chronic Conditions	Groups	Number Eligible	Number Eligible Weighted	Proportion Eligible (%)
1996-1997						
Main Analysis ^{a,b}	5	3	Whites	188	1,587,962	1.20
			Blacks	25	129,503	0.61
			Hispanics	28	108,154	0.56
Sensitivity Analysis 1 ^{a,b}	5	2	Whites	231	2,031,875	1.53
			Blacks	33	176,988	0.83
			Hispanics	32	137,787	0.71
Sensitivity Analysis 2 ^{a,b}	2	3	Whites	195	1,701,271	1.28
			Blacks	26	135,702	0.64
			Hispanics	31	112,135	0.58
Sensitivity Analysis 3 ^{a,b}	2	2	Whites	246	2,249,435	1.70
			Blacks	34	183,187	0.86
			Hispanics	36	145,801	0.75
Sensitivity Analysis 4 ^{a,b}	8	3	Whites	157	1,298,260	0.98
			Blacks	22	110,943	0.52
			Hispanics	24	91,152	0.47
Sensitivity Analysis 5 ^{a,b}	8	2	Whites	184	1,547,487	1.17
			Blacks	28	140,313	0.66
			Hispanics	26	109,748	0.57
2009-2010						
Main Analysis ^{a,b}	5	3	Whites	561	8,216,965	4.52
			Blacks	178	998,063	3.00
			Hispanics	155	814,959	1.87
Sensitivity Analysis 1 ^{a,b}	5	2	Whites	632	9,292,456	5.11
			Blacks	195	1,115,566	3.36
			Hispanics	169	892,024	2.05

Analyses	Number of Part D Drugs	Number of Chronic Conditions	Groups	Number Eligible	Number Eligible Weighted	Proportion Eligible (%)
Sensitivity Analysis 2 ^{a,b}	2	3	Whites	623	9,196,439	5.06
			Blacks	192	1,068,202	3.21
			Hispanics	169	897,925	2.06
Sensitivity Analysis 3 ^{a,b}	2	2	Whites	742	11,114,187	6.11
			Blacks	224	1,266,482	3.81
			Hispanics	197	1,096,409	2.52
Sensitivity Analysis 4 ^{a,b}	8	3	Whites	420	5,948,901	3.27
			Blacks	132	744,172	2.24
			Hispanics	120	629,852	1.45
Sensitivity Analysis 5 ^{a,b}	8	2	Whites	456	6,479,545	3.56
			Blacks	137	787,229	2.37
			Hispanics	125	648,388	1.49

^a $p < 0.05$ for the difference between Whites and Blacks.

^b $p < 0.05$ for the difference between Whites and Hispanics.

Table 4
Trend in MTM Eligibility Disparities among the Non-Medicare Population Based on the Main Analyses of the 2008 and 2010 Criteria

2008 Criteria	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Interval
Intercept	-11.41	0.44	666.85	<.0001	--	--
Non-Hispanic Whites	--	--	--	--	--	--
Non-Hispanic Blacks	-1.19	0.35	11.68	<0.01	0.30	0.15-0.60
Hispanics	-0.68	0.30	5.19	0.02	0.51	0.28-0.91
Whites (1996-1997)	--	--	--	--	--	--
Blacks (2009-2010)	0.71	0.37	3.79	0.05	2.04	1.00-4.20
Hispanics (2009-2010)	0.02	0.33	<0.01	0.96	1.02	0.53-1.95
Year 1996-1997	--	--	--	--	--	--
Year 2009-2010	1.33	0.14	89.97	<.0001	3.77	2.87-4.96
Age	0.07	<0.01	256.61	<.0001	1.07	1.06-1.08
Female	--	--	--	--	--	--
Male	-0.33	0.10	11.51	<0.01	0.72	0.59-0.87
Not married	--	--	--	--	--	--
Married	0.11	0.10	1.25	0.26	1.12	0.92-1.35
No insurance	--	--	--	--	--	--
Any private insurance	1.27	0.20	41.76	<.0001	3.57	2.43-5.25
Public insurance only	1.88	0.20	91.30	<.0001	6.58	4.47-9.68
Poor	--	--	--	--	--	--
Near poor	-0.22	0.24	0.80	0.37	0.81	0.50-1.29
Low income	-0.27	0.20	1.84	0.18	0.76	0.52-1.13
Middle income	-0.17	0.18	0.89	0.34	0.85	0.60-1.20
High income	-0.01	0.19	<0.01	0.95	0.99	0.68-1.43
Lower than high school	--	--	--	--	--	--
GED or high school	0.18	0.13	1.94	0.16	1.19	0.93-1.53
Bachelor	0.11	0.18	0.40	0.53	1.12	0.79-1.58
Master degree or higher	0.56	0.19	8.96	<0.01	1.75	1.21-2.52
Other education	0.14	0.19	0.54	0.46	1.15	0.80-1.65

	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Interval
Northeast	--	--	--	--	--	--
Midwest	0.16	0.15	1.23	0.27	1.18	0.88-1.58
South	0.18	0.15	1.42	0.23	1.20	0.89-1.61
West	0.03	0.17	0.03	0.87	1.03	0.74-1.42
Non-MSA	--	--	--	--	--	--
MSA	>0.01	0.15	<0.01	0.98	1.00	0.75-1.33
Excellent self-perceived health	--	--	--	--	--	--
Very good self-perceived health	1.49	0.25	36.14	<.0001	4.44	2.73-7.22
Good self-perceived health	2.45	0.27	84.00	<.0001	11.59	6.86-19.56
Fair self-perceived health status	3.54	0.26	178.76	<.0001	34.54	20.55-58.05
Poor self-perceived health	4.15	0.27	232.66	<.0001	63.29	37.14-107.84
2010 Criteria						
Intercept	-10.85	0.39	779.92	<.0001	--	--
Non-Hispanic Whites	--	--	--	--	--	--
Non-Hispanic Blacks	-0.84	0.24	11.76	<0.01	0.43	0.27-0.70
Hispanics	-0.67	0.27	6.34	0.01	0.51	0.30-0.86
Whites (1996-1997)	--	--	--	--	--	--
Blacks (2009-2010)	0.30	0.27	1.28	0.26	1.35	0.80-2.27
Hispanics (2009-2010)	0.02	0.29	0.01	0.93	1.03	0.58-1.81
Year 1996-1997	--	--	--	--	--	--
Year 2009-2010	1.24	0.11	124.48	<.0001	3.47	2.79-4.32
Age	0.07	0.01	292.09	<.0001	1.07	1.06-1.08
Female	--	--	--	--	--	--
Male	-0.37	0.09	17.03	<.0001	0.69	0.58-0.83
Not married	--	--	--	--	--	--
Married	0.04	0.08	0.20	0.66	1.04	0.88-1.22
No insurance	--	--	--	--	--	--
Any private insurance	1.25	0.17	53.68	<.0001	3.49	2.50-4.88
Public insurance only	1.87	0.17	122.30	<.0001	6.51	4.67-9.08
Poor	--	--	--	--	--	--

	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Interval
Near poor	-0.07	0.20	0.11	0.74	0.93	0.63-1.40
Low income	-0.22	0.18	1.55	0.21	0.80	0.57-1.14
Middle income	-0.10	0.15	0.46	0.50	0.90	0.67-1.21
High income	0.07	0.15	0.23	0.63	1.08	0.80-1.44
Lower than high school	--	--	--	--	--	--
GED or high school	0.15	0.11	1.71	0.19	1.16	0.93-1.45
Bachelor	0.09	0.15	0.37	0.55	1.09	0.82-1.45
Master degree or higher	0.49	0.16	9.64	<0.01	1.64	1.20-2.23
Other education	0.13	0.17	0.60	0.44	1.14	0.82-1.61
Northeast	--	--	--	--	--	--
Midwest	0.21	0.12	2.94	0.09	1.24	0.97-1.57
South	0.20	0.12	2.52	0.11	1.22	0.96-1.55
West	-0.05	0.16	0.09	0.77	0.96	0.71-1.30
Non-MSA	--	--	--	--	--	--
MSA	0.01	0.10	0.01	0.92	1.01	0.83-1.23
Excellent self-perceived health	--	--	--	--	--	--
Very good self-perceived health	1.41	0.20	51.99	<.0001	4.10	2.80-6.02
Good self-perceived health	2.35	0.24	98.42	<.0001	10.52	6.61-16.74
Fair self-perceived health status	3.49	0.23	225.71	<.0001	32.89	20.85-51.87
Poor self-perceived health	4.10	0.25	262.38	<.0001	60.06	36.59-98.57

Variables based on the Andersen's model are predisposing factors (age, gender, and marital status), enabling factors (highest degree received, income, insurance status, metropolitan statistical area, and geographic regions), and need factor (self-perceived health status).

Table 5
Difference in Marginal Effects in MTM Eligibility Disparities among the Non-Medicare Population Based on the Main Analyses of the 2008 and 2010 Criteria

Comparison Groups	Unadjusted Model				Adjusted Model			
	Coeffi.	SE	P	95% Confidence Interval	Coeffi.	SE	P	95% Confidence Interval
2008 Eligibility Criteria								
Whites & Blacks	-0.002	0.003	0.41	(-0.01)- (0.003)	-0.004	0.004	0.22	(-0.01)- (0.003)
Whites & Hispanics	-0.02	0.003	<0.001	(-0.02)- (-0.01)	-0.02	0.003	<0.001	(-0.02)- (-0.01)
2010 Eligibility Criteria								
Whites & Blacks	-0.01	0.004	0.14	(-0.01)-0.002	-0.01	0.005	0.05	(-0.02)-(-0.00002)
Whites & Hispanics	-0.02	0.004	<0.001	(-0.03)- (-0.01)	-0.03	0.004	<0.001	(-0.03)- (-0.02)

Coeffi.=coefficient, an estimate on the difference in differences in marginal effects across racial and ethnic groups between 2009-2010 and 1996-1007.

SE: Standard error.

Different decimal places were used to accommodate low values of the estimates.