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Disparity Implications of the Medicare MTM Eligibility Criteria: A Literature Review

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Summary

The emphasis on eliminating racial and ethnic disparities in health care has received national attention, with various policy initiatives addressing this problem and proposing solutions. However, in the current economic era requiring tight monetary constraints, emphasis is increasingly being placed on economic efficiency, which often conflicts with the equality doctrine upon which many policies have been framed. Our review aims to highlight the disparity implications of one such policy provision—the predominantly utilization-based eligibility criteria for medication therapy management (MTM) services under Medicare Part D—by identifying studies that have documented racial and ethnic disparities in health status and the use of and spending on prescription medications. Future design and evaluation of various regulations and

legislations employing utilization-based eligibility criteria must use caution in order to strike an equity-efficiency balance.

Keywords

race; ethnic; disparities; prescription medications; access; utilization; expenditures; health status; Medicare; Medicaid

Introduction

The Report of the Secretary's Task Force on Black and Minority Health, released by the Department of Health and Human Services (HHS) in 1985, was the first comprehensive report released by the U.S. government that addressed racial and ethnic disparities in health care [1, 101]. This report highlighted the "national paradox" characterized by the simultaneous existence of phenomenal scientific progress leading to overall improvements in population health status coupled with prevalent and significant health care disparities among the minority groups in America [101]. Ever since then, a steady flow of studies and reports have attempted to document racial and ethnic disparities in the myriad facets of health and health care in the United States.

Many reports documenting significant racial and ethnic inequities in access to care and in use of health care services for different diseases and health conditions have changed the landscape considerably [2, 3, 4]. There is now a heightened sense of awareness and cognizance of racial and ethnic disparities in health care, which in turn, has led to the formulation and implementation of many newer policies and programs intended to tackle this issue. The Department of Health and Human Services (HHS) unveiled the HHS Action Plan to Reduce Racial and Ethnic Health Disparities, in 2011 [102]. This initiative provides a framework to the federal agency to collaborate with other public and private agencies as well as communities to work toward creating a health care system free of disparities [1]. Healthy People 2020 has made elimination of disparities one of its four overarching goals to be achieved by 2020 [5, 103]. Thus, more resources and research need to be devoted to not only identifying the root causes of racial and ethnic disparities but also to assessing the impact of various policies and legislations to ensure equitable access to and utilization of health care resources among all sections of the population.

A well-established and widely cited theoretical framework to understand disparities was developed by Dr. Camara Phyllis Jones of the Centers for Disease Control and Prevention [6]. The framework depicts three levels of causes of racial disparities: institutionalized, personally mediated, and internalized. Institutionalized disparities refer to a system in which differential access to goods, services, and opportunities of society by race is normalized, legalized, and structured to the extent that it has been "codified in our institutions of custom, practice, and law, so there need not be an identifiable perpetrator" [6, p. 1212]. Personally mediated disparities arise from both prejudice and discrimination because of "differential assumptions about the abilities, motives, and intentions of others, and differential actions toward others, according to their race" [6, p. 1212–1213]. Finally, internalized disparities occur when there is "acceptance by members of the stigmatized races of negative messages about their own abilities and intrinsic worth" and as a result, they do not believe in themselves and in those who share their appearance [6, p. 1213]. Among the three causes, the institutionalized cause of racial and ethnic disparities is more relevant to the discussions of disparities related to health policy.

The Medicare Modernization Act of 2003 (MMA) included a requirement that prescription drug plans must provide medication therapy management (MTM) services to certain Medicare Part D beneficiaries [7]. MTM services consist of a distinct list of services intended to optimize therapeutic outcomes [8]. At the core of these services lies the formulation of a medication treatment plan by pharmacists or other health care providers and the integration of medication management within the broader context of all health services provided to patients for the purpose of optimizing therapeutic outcomes [9]. According to the Centers for Medicare and Medicaid Services (CMS) and MMA guidelines, Part D plans are required to provide the MTM services to beneficiaries who meet the following three criteria: (1) individuals with a minimum of three chronic conditions, (2) individuals taking a minimum of eight prescriptions, and/or (3) individuals with an annual drug cost of \$3,000 or more [104]. The value of MTM for chronic disease management, including diabetes and hypertension, has been widely recognized in the scientific literature, by government agencies, and by the 2010 Patient Protection and Affordable Care Act (PPACA) [10–13, 105]. These services are extremely important for Medicare beneficiaries because more than 80% of the elderly have one or more chronic conditions, and 65% have at least two chronic conditions [14]. In addition, several chronic conditions, including diabetes and hypertension, contributed significantly to the increase in Medicare spending from 1997 to 2006 [15].

Policy makers in pursuit of achieving economic efficiency may neglect the impact of new policies or regulations on equity. With the current economic downturn, tight fiscal budgetary constraints may be imposed on various legislations and policy initiatives. Implementations of value-based strategies therefore become more likely when public and private payers in the U.S. are designing future insurance policies to improve economic efficiency. MTM, with its utilization-based eligibility requirements, can be viewed as a value-based strategy because individuals with complex drug regimens (i.e., using a greater number of medications) and higher spending on medications are deemed more likely to benefit from the MTM services. However, as observed by Wang and colleagues in their analysis of MTM eligibility criteria using the Medical Expenditure Panel Survey (MEPS) data, Hispanic and African American beneficiaries had a lower likelihood of meeting MTM eligibility criteria when compared to Whites [16]. This pattern of racial/ethnic disparity was observed both based on the original MTM eligibility criteria in 2006 (range of odds ratios [ORs] for Blacks = 0.36–0.60, $P < 0.05$; range of ORs for Hispanics = 0.13–0.46, $P < 0.05$), and the new criteria (described above) that began in 2010 (range of ORs for Blacks = 0.65–0.71, $P < 0.05$; range of ORs for Hispanics = 0.48–0.59, $P < 0.05$) [16]. In addition, among the Medicare beneficiaries with severe health problems, similar patterns of disparities between the two minority groups and Whites were observed. These findings suggest that utilization-based eligibility criteria, such as those for MTM services under Medicare Part D, may have unintended consequences leading to the preclusion of certain vulnerable populations from accessing these services. These unintended consequences may have an inherent racial and ethnic bias or widen the racial and ethnic disparities [16].

For decades, researchers have documented the extent to which disparities exist and the sources that contribute to these disparities. The evidence thus generated has proved pivotal in shifting focus towards implementing policies to tackle disparities and inequalities in health and health care in countries such as the United States and the United Kingdom [17]. The empirical evidence documenting racial and ethnic disparities in the use and costs of prescription drugs is abundant, with most of the reports indicating persistent disparities between minorities and their majority counterparts. Our objective was to document the differences in the use of, and expenditures on prescription medications and the differences in health status across various racial and ethnic groups to highlight the disparity implications of utilization-based eligibility criteria, such as those of MTM under Part D. CMS is cognizant of the fact that these MTM eligibility criteria may lead to disparities, and has acknowledged

that it is willing to further alter the eligibility criteria in future rulemaking, provided that the findings of Wang and colleagues are validated by it [104]. Our literature review would help the academic community and the policy makers to better understand how utilization-based MTM eligibility criteria would lead to racial and ethnic disparities in meeting these criteria. Our purpose is to represent the general patterns exhibited in the literature, rather than present an exhaustive review of the literature. We have divided the empirical studies from our review into three sections: studies documenting disparities in the Medicare population, those in the Medicaid population, and finally those in the general population. Evidence suggests that health insurance plans other than Part D plans have not only included MTM programs, but some have even followed the Part D MTM eligibility criteria [18, 106]. It is evident that Medicare plays the role of a catalyst in the design of MTM plans offered to the non-Medicare population. Considering this, we have included the Medicaid and the general population to highlight the fact that disparities arising from the utilization-based eligibility criteria would not only affect the Medicare population, but the non-Medicare population as well.

Methods

We used the PubMed database to search for studies that were conducted in the United States and published in peer-reviewed journals between 1985 and 2011. This time period was chosen because 1985 was the year when the HHS released its Report of the Secretary's Task Force on Black and Minority Health. "Race", "ethnic", "disparities", "prescription medications", "access", "utilization", "expenditures", "health status", "Medicare", "Medicaid", were the search terms used in various combinations. These search methods led to the finding of 348 publications. From these search results, we selected only those studies which 1) addressed racial and ethnic disparities in health status or prescription drug use and expenditures in the Medicare, Medicaid, or general population, and 2) presented robust quantitative data with original findings. The reference lists of selected articles were also examined to include additional relevant studies. Rather than providing exhaustive information from the 110 studies which were selected using these criteria, we narrowed the focus of this review by including newer studies among studies on similar disease states and drug categories. Although our review was not meant to be comprehensive, or to study publication bias, a pattern did become obvious that most studies found reported significant racial and ethnic disparities.

Results

Medicare population

Studies that have focused on the influence of race and ethnicity on medication use and prescription drug spending among the Medicare population have generally reported disparities between Blacks, Hispanics, and their White counterparts (Table 1). Using the 1999 Medicare Current Beneficiary Survey (MCBS) Cost and Use files, Briesacher and colleagues compared drug coverage and prescription use by race and ethnicity for Medicare beneficiaries with diabetes, hypertension, or heart disease [19]. The authors found that Blacks and Hispanics used approximately 10 to 40% fewer medications on average and spent up to 60% less in total drug costs than did Whites. Barring beneficiaries with Medicare + Choice coverage, significant disparities in medication use and expenditures were observed between minorities and Whites with similar disease profiles and insurance status. The authors speculated that the disparities observed in this study could be attributed to socioeconomic differences among beneficiaries [19]. Using the 1999 MCBS Cost and Use files, Gaskin and colleagues explored prescription drug spending and use among a sample of Medicare beneficiaries [20]. They found that Black and Hispanic Medicare beneficiaries had lower total spending ($P<0.05$) and out-of-pocket (OOP) spending ($P<0.05$) for prescription

drugs than did White beneficiaries. The authors concluded that the differences in OOP spending could result from minorities having lower socioeconomic status and higher likelihood of having Medicaid [20].

The 2003 MMA stipulated that beginning in 2006, prescription drug coverage for all Medicare and Medicaid dual eligible enrollees would be shifted from Medicaid to Medicare Part D [7]. Racial and ethnic disparities have also been documented in the prescription drug utilization among these dually eligible beneficiaries. Philips and Atherly used the Medicaid pharmacy claims data for dually eligible Medicare beneficiaries in a Medicaid home- and community-based services (HCBS) program from four regions in Georgia [21]. They sought to determine the prescription drug costs and their predictors for the study population. African Americans were found to incur significantly lower drug expenditures in comparison to Caucasians ($P<0.01$) in this study population [21]. Using claims data from 1995, Schore and colleagues examined racial disparities in Medicaid pharmacy use among Black and White dually eligible Medicare beneficiaries from the CMS' dually eligible beneficiary databases for 10 U.S. States [22]. They found that Blacks spent approximately 20% less per month on prescription drugs than did White beneficiaries (\$83 vs. \$102) in all but one state and used fewer drugs than did Whites in all of the states considered in that study [22].

Many reports have also documented drug-specific and disease-specific disparities including those among beneficiaries diagnosed with cardiovascular diseases, mental disorders and hypertension. Using the 1998 Health Plan Employer Data and Information Set (HEDIS), Schneider and colleagues examined four measures of quality of care, one of which included beta-blocker use after myocardial infarction [23]. They found that Black Medicare managed care enrollees who had suffered heart attacks were less likely than were Whites to receive beta-blockers ($P<0.005$). Using the MCBS data from 2001 to 2003, Zuckerman and colleagues sampled Medicare beneficiaries with dementia [24]. Approximately 30% higher use of anti-dementia medications was found among non-Hispanic Whites compared to other racial and ethnic groups ($P<0.05$) [24]. Using two national databases of the Veterans Health Administration, Poon and colleagues examined racial and ethnic differences in the use of, and adherence to, medications in a cohort of veterans diagnosed with hypertension and dementia [25]. In comparison to Whites, African Americans were found to have a lower likelihood of receiving certain medications for hypertension such as angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers and dementia medications such as acetylcholine esterase inhibitors and *N*-methyl-D-aspartate antagonists ($P<0.05$). Barring ACE inhibitors, Hispanics were less likely to receive many other medications for hypertension as compared to Whites ($P<0.05$) [25].

Empirical studies have also found racial and ethnic disparities in the prevalence and management of certain chronic conditions such as diabetes, chronic kidney disease and HIV. From their findings, Gornick and colleagues observed that nonelective surgeries, such as lower limb amputations (6.03 vs. 1.74, per 1,000), and implantation of shunts or cannulae for chronic renal dialysis (2.13 vs. 0.47, per 1,000), were performed more frequently among Black Medicare beneficiaries as compared to Whites beneficiaries. These findings indicated that Blacks were at a greater risk of undergoing surgical procedures associated with poor management of chronic conditions such as diabetes and end stage renal disease (ESRD) [26, 27]. Using data from the Veterans Aging Cohort 3-Site Study (VACS 3), McGinnis and colleagues examined disparities in survival among HIV-positive US veterans [28]. Black and Hispanic veterans were found to have higher mortality rates (hazards ratio [HR]: 1.41; 95% CI: 1.19–1.66; and 1.41; 95% CI: 1.06–1.86, respectively) compared to Whites. In addition, the proportion of veterans with four or more medical comorbidities ($P<0.001$) and three or more HIV conditions ($P=0.002$) was higher among Blacks and Hispanics in comparison to Whites [28].

Using data from the Cooperative Cardiovascular Project Data for the years 1994 to 2004 of Medicare patients diagnosed with myocardial infarction, Newsome and colleagues examined racial differences in progression to ESRD [29]. African Americans were found to be at a significantly greater risk of developing ESRD compared to Whites (HR: 1.90; 95% CI: 1.78–2.03), with the likelihood of incident ESRD being higher in African Americans at various baseline estimate glomerular filtration rate (eGFR) levels ($P<0.001$) [29]. Using MCBS data from 1992 to 2004, Ciol and colleagues examined racial and ethnic disparities in disability-related outcomes such as limited mobility, activities of daily living (ADL), and instrumental activities of daily living (IADL) [30]. Despite a slight overall decrease in the ADL and IADL disability during this period, racial and ethnic disparities in disability outcomes persisted, especially Black-White disparities ($P<0.001$). The authors attributed these findings to factors such as access to health care and cultural differences in self-reporting of disability levels [30]. To examine the association of certain medical conditions with racial disparities in disability rates, Whitson and colleagues analyzed data from a cohort of adults >68 years participating in the Duke Established Populations for Epidemiologic Studies of the Elderly [31]. They found that higher rates of obesity and diabetes mellitus in Blacks contributed to more than 30% excess disability in them. Blacks had a greater likelihood of being obese compared to Whites after adjusting for confounders (OR: 1.73; 95% CI: 1.32–2.26) [31].

Medicaid Population

Various studies have documented racial and ethnic disparities among Medicaid enrollees in various state Medicaid programs in relation to access, use and expenditures on prescription medications, and health status of enrollees (Table 2). Among the earliest studies documenting racial and ethnic inequities in medication use among the Medicaid population was the one by Kotzan and colleagues who intended to determine the effects of age, gender, and race on the use of prescription drugs among a sample of Georgia Medicaid enrollees [32]. The researchers used the Medicaid prescription claims data from 1985 for that state. Whites were found to use a higher mean number of prescriptions when compared to non-Whites; this difference increased as age increased ($P=0.05$) [32]. Using the 1992 Medicaid Statistical Information System (MSIS) data from Georgia to determine racial disparities in prescription drug use and expenditures among the enrollees, Khandker and Simoni-Wastila found that Black children, adults, and elderly all used fewer prescription drugs compared to their White counterparts (43%, 30%, and 18% fewer respectively; $P<0.01$) [33]. Drug spending was also higher among Whites compared to Blacks (\$382 vs. \$202 per enrollee). The authors speculated that these differences resulted from either differences in severity of illness between Blacks and Whites or from disparities in access to first-line drugs [33]. Among the dual Medicare and Medicaid beneficiaries, significant racial and ethnic disparities were also documented in prescription drug utilization and expenditures as reported in the previous section on Medicare population [21, 22].

Significant racial and ethnic disparities have been documented in disease-specific studies, especially in relation to mental disorders and their treatments. In a mid-Atlantic state Medicaid program in 2000, Zito and colleagues examined whether there were differences in the magnitude of disparities in the use of psychotropic medications between Black and White youths as a result of Medicaid eligibility categories [34]. Multivariate analyses showed that White-Black disparities were significant and varied for different Medicaid eligibility categories (range of ORs = 2.2–3.8) [34]. Depp and colleagues analyzed longitudinal trends in the utilization of antipsychotics and mood stabilizers for bipolar disorder treatment [35]. They used the data from California's Medi-Cal for Medicaid enrollees from 2001 to 2004 and found that, compared to non-Latino Whites, African Americans and Latinos were less likely to receive antipsychotics or mood stabilizers

($P<0.001$) [35]. Horvitz-Lennon and colleagues, in their analysis of Florida Medicaid program's claims data for 1994 to 2006, also found significant Black-White ($P<0.001$) and Hispanic-White disparities ($P<0.001$) in spending on psychotropic drugs [36].

Disparities in access to, and use of, HIV/AIDS pharmaceuticals have also been widely documented in Medicaid enrollees. Crystal and colleagues analyzed merged data consisting of administrative claims data and HIV/AIDS surveillance data from the New Jersey Medicaid program up to 1998 [37]. Their objective was to examine the initiation of and persistence of use of newer antiretroviral treatments administered, namely protease inhibitors (PI) and nonnucleoside reverse transcriptase inhibitors (NNRTI), and explore any associations with patient characteristics. African Americans and Hispanics were found to experience approximately 8 to 9 months of delay ($P<0.05$) in treatment initiation compared to Whites [37]. Additionally, less-consistent use of the PI/NNRTI treatment after the first prescription was seen among minorities ($P<0.05$) [37]. King and colleagues examined the 1998 Medicaid claims data for highly active antiretroviral therapy (HAART) for five states [38]. The authors found that non-Hispanic Blacks ($P<0.001$) and Hispanics ($P=0.003$) were found to have significantly lower likelihood of receiving HAART compared to Whites [38].

Studies documenting use of some of the other classes of medications and related disease states among Medicaid enrollees have also found racial and ethnic disparities. Lieu and colleagues used the American Academy of Pediatrics (AAP) Children's Health Survey for Asthma to document asthma status and care processes reported by the parents interviewed with the intention of investigating any racial and ethnic variations in their children's care [39]. Despite having worse asthma status, Black ($P=0.01$) and Latino children ($P=0.005$) were less likely to use asthma-preventing medications than were Whites. Possible explanations were differences in health beliefs and concepts of disease [39]. Shaya and colleagues determined the association of race with the likelihood of being prescribed selective cyclooxygenase-2 inhibitors (COX-2) versus any other nonsteroidal anti-inflammatory agents (NSAID) [40]. They analyzed data on enrollees from a mid-Atlantic state's Medicaid managed care organizations. The authors found that African Americans along with other races had a lower likelihood (OR: 0.67; 95% CI: 0.62–0.73) of being prescribed a COX-2 as compared to Whites [40]. Litaker and colleagues analyzed the pharmacy claims data from 1992 to 1999 in the Ohio Medicaid program to examine disparities in cardiovascular disease prevention with respect to the use of lipid-lowering agents, including statins, fibrates, and bile sequestrants [41]. The study found that the odds of younger minority adults (< 60 years old) were lower for being either previous users ($P=0.01$), new users ($P=0.04$), or long-term users ($P=0.001$) of lipid-lowering agents, compared to their White counterparts [41].

Not many studies have documented racial and ethnic disparities in health status among Medicaid enrollees for specific conditions, and none that we found has documented disparities in the health status in general among enrollees. However, disparities in various other aspects of health care such as access to, use of, and expenditures for, prescription medications and other health services, as evidenced from the studies mentioned above, can contribute toward producing racial and ethnic inequities in the likelihood of meeting predominantly utilization-based eligibility criteria among Medicaid enrollees.

General Population

Documented evidence examining the relationship of race and ethnicity with the utilization of prescription medications is not extensive. The studies, generally conducted in both adults and children, demonstrate patterns of disparities in access to, use of, and expenditures for prescription medications (Table 3). Using the 1996 MEPS data, Chen and Chang examined the association of various factors, including race and ethnicity, with prescription drug

expenditures among the pediatric population aged 0 to 17 [42]. Black children were found to have approximately 33% lower likelihood of using prescription medications ($P<0.001$) compared to White children. In addition, Black ($P<0.001$), Hispanic ($P=0.025$), and Asian ($P=0.010$) children had significantly lower expenditures for prescription medications when compared to White children [42]. Possible reasons according to the authors were cultural and personal preferences and differing insurance types [42].

Using the MEPS data from 1996 to 2001, Wang and colleagues examined racial and ethnic disparities in the use of essential new prescription medications among adults [43]. New medications were defined as those that existed in the market for fewer than 5 years at the time of the MEPS data collection; essential drugs were defined as those known to prevent worsening medical conditions, hospitalization, or death. Significant racial disparities in the use of these drugs were observed, with Blacks obtaining fewer such drugs compared to Whites (rate ratio (RR): 0.85; 99% C.I.: 0.73–0.98) [43]. The study found no statistically significant ethnic disparities in the use of essential new medications. Possible explanations for these findings were failure to fill all or refill all prescriptions, cultural barriers, lack of trust in the health care system, and intentional or unintentional racial prejudice by health care providers [43]. In another study using the same database and definition for new medications, Wang and colleagues examined racial and ethnic disparities in the use of new prescription medications [44]. They found that, compared to non-Hispanic Whites, non-Hispanic Blacks used approximately 22% fewer new medications ($P<0.01$), according to the 5-year criterion, and approximately 26–33% fewer new drugs ($P<0.01$) according to other criteria [44]. White-Hispanic differences were once again not always statistically significant. In addition to some of the possible explanations for such findings mentioned in their previous study, the authors suggested that lower likelihood by minorities of trying new drugs, presence of fewer pharmacies in minority neighborhoods, and lack of availability of new drugs in them might also have led to lower use of new prescription medications among minorities when compared to non-Hispanic Whites [44]. More recently, a study by Chen and colleagues examined ethnic disparities in the use and expenditure for prescription drugs [45]. Using the MEPS data from 1999 to 2006, the authors analyzed the data for Latinos according to various subethnicities (Puerto Ricans, Mexicans, Cubans, Central/South Americans, and other Latinos), and compared them to Whites [45]. The study found that, compared to Whites, Latinos were significantly less likely to use prescription drugs. Among the subgroups, Puerto Ricans were the most likely ($P<0.001$), and Cubans were the least likely ($P<0.001$) to use prescribed drugs. Whites also had significantly higher drug expenditures compared to Latinos ($P<0.001$), although the differences between Whites and Cubans were not statistically significant [45].

A major portion of the empirical evidence on racial and ethnic disparities in medication use and expenditure in the general population is either disease-specific or drug-class specific. Much of the literature in this area has examined HIV and mental illnesses and the medications used in their treatment. Using various patient-level factors, Smith and Kirking examined the relationship between use of antiretroviral and pneumocystis carinii pneumonia (PCP) medications with access to medical care [46]. They used the AIDS Costs and Services Utilization Survey (ACSUS) data, which consisted of up to six interviews with a cohort of a diverse group of HIV patients from 1991 to 1992. They found that non-Hispanic African Americans ($P=0.0187$) and Hispanics ($P=0.0044$) had a higher likelihood of receiving antiretroviral medications than did Whites and had no statistically significant difference in the likelihood of receiving PCPs. According to the authors, this finding could be due to the result of more severe stage of the disease among African Americans and Hispanics; thus, the minorities in this study may not have represented the typical users of antiretroviral drugs [46]. On the other hand, Gebo and colleagues found that, in a multistate sample of HIV patients in 2001, African Americans had a lower likelihood of receiving HAART compared

to Whites ($P=0.013$) [47]. They had examined data from 10 US HIV primary care sites in the HIV Research Network (HIVRN).

Among the studies examining disparities in mental illness, Han and Liu investigated disparities in the use of psychiatric drugs between Whites and Blacks, Hispanics, and Asian Indians [48]. The researchers used the MEPS data from 1996 to 2000. Compared to Whites, Blacks, Hispanics and Asian Indians were all less likely to use prescription drugs for mental illnesses ($P<0.01$), with the difference in prescription expenditures between Blacks and Whites being statistically significant ($P<0.01$) [48]. Wang and colleagues used the MEPS data for 2002 and 2003 to determine the economic implications of racial and ethnic disparities in use of selective serotonin reuptake inhibitors (SSRI) [49]. Non-Hispanic Whites, on average, used a higher number of SSRIs when compared to non-Hispanic Blacks and Hispanics ($P<0.05$). Additionally, non-Hispanic Blacks and Hispanic Whites had a lower likelihood of using SSRIs compared to non-Hispanic Whites ($P<0.05$). Cultural barriers, lack of trust in the health care system, and language barriers were some of the possible explanations noted by the authors [49]. Using data from two of the National Institute of Mental Health's Collaborative Psychiatric Epidemiology Surveys (CPES) from 2001 to 2003, González and colleagues investigated the existence of racial disparities in the use of antidepressants [50]. Compared to depressed White respondents, depressed Black respondents had significantly lower odds ($P<0.001$) of using antidepressants in the year before the data were collected [50].

Disparities have also been reported in the treatment of cardiovascular diseases. Winters and colleagues studied the influence of race and health insurance on prescription medication use and expenditures [51]. They used the MEPS data files from 1996 to 2003 to examine 18- to 64-year-old individuals who had reported any form of cardiovascular disease. African Americans, Hispanic Americans, and persons belonging to other races filled significantly fewer number of prescriptions ($P<0.01$) and had lower annual prescription medication expenses compared to European Americans ($P<0.001$) [51].

In our search for studies documenting disparities in the health status among the general population, in accordance with our objective, we found several publications which demonstrated the existence of such differences between minorities and Whites. In particular, significant racial and ethnic disparities were found to exist in the prevalence of chronic conditions, such as diabetes and hypertension. Brancati and colleagues used a prospective cohort study approach to determine racial and ethnic differences in the incidence of type-2 diabetes [52]. They found that the incidence rate in African American women was approximately 2.4 times greater compared to White women ($P<0.001$). African American men had an incidence rate that was 1.5 times greater compared to White men ($P<0.001$). African American men and women were also found to have higher blood pressures prior to the onset of diabetes, compared to their White counterparts ($P<0.05$) [52]. Kramer and colleagues examined the relationship between race and ethnicity and hypertension and its treatment [53]. They found that African Americans (OR: 2.21; 95% CI: 1.91–2.56) and Chinese (OR 1.30; 95% CI 1.07–1.56) had a higher likelihood of having hypertension. In addition, African Americans had a greater likelihood of having uncontrolled hypertension, even after being treated for it (OR: 1.35; 95% CI: 1.07–1.71) [53]. Racial and ethnic disparities have also been documented for some cancers such as prostate and breast cancer, indicating that minorities have higher morbidity and mortality rates compared to their majority counterparts among individuals diagnosed with the aforementioned forms of cancer [54, 55].

Using data from the Behavioral Risk Factor Surveillance System for 2007, Hayes and colleagues examined race and ethnicity and socioeconomic status disparities in the health-

related quality of life (HRQOL) among respondents with coronary heart disease [56]. The authors found that, in comparison to non-Hispanic Whites, Hispanics had a higher likelihood of reporting fair to poor health status ($P<0.001$), whereas Native Americans had the highest odds of reporting 14 or more total unhealthy days ($P=0.02$) and 14 or more activity-limited days ($P=0.002$). No significant differences between non-Hispanic Blacks and Asians in comparison to Whites were found in that study [56]. Carpenter and colleagues also reported ethnic disparities in health status with no significant Black-White disparity [57].

Discussion

Our review consistently documented disparities in utilization of, and expenditures on prescription medications, and in the health status between minority groups and Whites for all three population groups; the Medicare, Medicaid, and the general population. Among the Medicare beneficiaries and the dual eligible beneficiaries, studies have found that Blacks and Hispanics had significantly lower use of and spending on overall prescription medications and disease-specific medications such as antihypertensives and anti-dementia medications [19–25]. Disparities were also found to exist in their health status, with certain chronic conditions such as diabetes, ESRD, and obesity being more prevalent among minorities compared to Whites, resulting in greater disability-related outcomes among them [26–31]. Similar disparities were observed among the Medicaid enrollees in all the studies across several drug categories such as antipsychotics, mood stabilizers, HIV, asthma and cardiovascular medications [32–41]. Among the general population, the empirical evidence supports the notion that significant Black-White and Hispanic-White disparities exist in the use of and spending on HIV medications, psychiatric drugs, antidepressants, and cardiovascular drugs [42–51]. Minorities were also found to be more likely to report poor health status, with a greater prevalence of diabetes and hypertension among them [52–57].

A variety of reasons and explanations have been given to account for the existence of these disparities, such as differing socioeconomic status measures, health beliefs and patient perceptions, severity of diseases and stage at which diagnoses were made, and even intentional and unintentional bias in treatment by providers [19–57]. Our review clearly demonstrates lower utilization of and spending on prescription drugs by minorities in comparison to Whites, despite poorer health status, and greater prevalence of certain chronic conditions among them. Two of the three criteria for being eligible to receive the much-needed, broad range of MTM services under Part D require beneficiaries to consume a certain number of medications; the upper threshold being 8 drugs; and incur spending of \$3,000 or more on their medications annually. It is clear from this review, and from the findings of Wang and colleagues [16], that such utilization-based MTM eligibility criteria have inherent disparity implications. Such criteria may further widen the gap in the care received by minorities and their White counterparts, and may run contrary to the objectives of various federal and state initiatives to eliminate health disparities.

In its report entitled *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare*, the Institute of Medicine (IOM) defined healthcare disparities as “racial or ethnic differences in the quality of health care that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention.” [4, p. 3–4] The report further observed that “Racial and ethnic disparities in health care exist, and are consistent and extensive across a range of medical conditions and health care services, are associated with worse health outcomes, and occur independently of insurance status, income, and education. ...” [4, p. 79] The empirical evidence from our review of the literature on prescription medication use and expenditure and the health status of populations of different races and ethnicities are consistent with the IOM report.

“Race,” which is considered a sociopolitical construct, has been used by researchers to allocate individuals in accordance with the levels of social stress faced and the amount of medical care received by them [58, 59, 60]. “Ethnicity” on the other hand, is a broad social concept that has been used to categorize individuals based on such characteristics as shared nationality, tribal affiliation, religious faith, shared language, or cultural and traditional origins and backgrounds [61]. The availability of high-quality data for all racial and ethnic groups is extremely critical for researchers to be able to identify specific root causes of disparities in various health care settings, and in turn, design measures to address them. Under the 2010 PPACA’s Section 4302, the HHS is directed to develop and maintain standards for collection and dissemination of demographic information for all federal health care and public health programs, activities or surveys [105]. Apart from collecting information on gender, geographic location, disability status, and other such variables that can address health disparities, this provision states that the Office of Management and Budget standards must be used at a minimum, for race and ethnicity measures [105]. An increased availability and quality of such data can help researchers identify hitherto unexplored areas of health inequities, thereby bolstering the efforts of various national health and strategic planning initiatives such as the HHS Action Plan to Reduce Racial and Ethnic Health Disparities and the Healthy People initiatives, to successfully achieve their goals of complete elimination of racial and ethnic disparities in health care.

In addition to the social justice argument, recent studies have also attempted to justify the elimination of disparities from an economic perspective. In one such study by LaVeist and colleagues, the researchers analyzed the MEPS data between 2003 and 2006, and found that the total combined costs of health inequalities, which included the direct medical and indirect costs of health disparities and the costs of premature death, totaled \$1.24 trillion in the U.S. during this time [62]. These direct medical expenditures and indirect costs would have been reduced by \$229.4 billion and more than \$1 trillion respectively, had health inequalities been eliminated from the health care system during the same period [62]. In another study by Waidmann using the same database, the author estimated that in 2009, the disparities between non-Hispanic Whites and racial and ethnic minorities would have cost \$23.9 billion to the health care system, of which the cost to Medicare alone would have been \$15.6 billion [107]. These findings indicate that inequalities in health care exert tremendous economic burden on the overall health care system in the U.S, and eliminating them could potentially save billions of dollars. Ensuring that policies pertaining to MTM eligibility criteria do not perpetuate racial and ethnic disparities may thus, also lead to savings of health care dollars.

Disparities in health care may not always be easy to detect or eliminate. Studies documenting racial and ethnic disparities arising from utilization-based eligibility criteria are rare, which may suggest that such disparities are not directly perceptible. In a study by Fishman and colleagues, African Americans with cancer were found to be more likely to be excluded from hospice services in comparison to their White counterparts, despite the fact that they were more likely to perceive needing such services [63]. The reason was that the eligibility criteria for hospice services required that cancer patients give up their curative cancer treatments; however, African Americans were found to have a strong preference for continuing their curative treatment. MTM services, too, have stringent, utilization-based eligibility criteria. However, the bulk of the evidence from our review of the literature shows that racial and ethnic minorities have lower consumption of, and spending on prescription drugs as compared to Whites, despite evidence suggesting that they have worse health status and suffer from poorer health outcomes in comparison to their White counterparts [63].

Several legal and policy changes have taken place since the release of the Report of the Secretary’s Task Force on Black and Minority Health in 1985. The Balanced Budget Act

(BBA) of 1997 stipulated significant cuts in Medicare and Medicaid reimbursement to health care providers, in addition to granting States the authority to enroll Medicaid beneficiaries in managed care organizations (MCOs) without seeking a federal waiver [108]. The 2003 MMA established prescription drug coverage for all beneficiaries under the Medicare Part D [7]. Research has shown that following Part D implementation in 2006, disparities in access to medications and prescription drug expenditures have started to decline [64]. The 2010 PPACA vastly changed the landscape of the U.S. health care system with the most comprehensive overhaul of health care yet [105]. It includes several key provisions that address health disparities. Chief among them are Section 5307, which focuses on improving the diversity of the health care workforce and its competency in treating patients of different races and ethnicities, Section 10334, which strengthens the HHS's administrative capabilities to address health issues of minorities, and the aforementioned Section 4302, which advances collection of health information by race, ethnicity and primary language [105]. Some of these long-term goals of eliminating racial and ethnic disparities provided a strong foundation for the implementation of the HHS's Action Plan to Reduce Racial and Ethnic Health Disparities in 2011, with a focus on reducing, and eventually eliminating health disparities [102]. When evaluating the Healthy People 2010 initiative, out of the 169 objectives for which data for various racial and ethnic groups were available, there were no changes in disparities for 111 (69%) objectives [109]. With Healthy People 2020 proposing similar goals of eliminating health disparities as Healthy People 2010, it is imperative to understand disparity implications of policies, laws and regulations to ensure that such disparities are reduced, and eventually eliminated in the coming decades.

According to Dr. Jones' theoretical framework for understanding disparities mentioned earlier, policies or systems that lead to racial and ethnic disparities can be classified as institutionalized causes of disparities [6]. Overlooking the empirical evidence on prescription drug utilization, expenditures, and health status among minorities, may perpetuate institutionalized causes of racial and ethnic disparities arising from the utilization-based MTM eligibility criteria. Previous studies, such as the one by Fishman and colleagues [63] and Wang and colleagues [16], have examined the institutionalized causes of racial and ethnic disparities in health policies. The MTM eligibility thresholds are not rigid and are subject to continuous evaluation and development [104]. Our review of the literature indicates the existence of significant disparities in prescription drug use and spending and in health status among various racial and ethnic groups. Future decision-making must consider all the available evidence when contemplating policy changes to the MTM eligibility provisions to even out any disparities among the various sections of the population.

A major strength of our review is that it documents well disparities in drug utilization and expenditures and in the health status between minorities and Whites to enable the readers to understand the disparity implications of the predominantly utilization-based MTM eligibility criteria under Medicare Part D. In addition, by including the Medicaid and the general population in this literature, we are able to demonstrate disparity implications of these eligibility criteria among the non-Medicare population as well. More than two decades of research has shown that not only overall prescription drug use is lower, but disease-specific drugs such as those for cardiovascular disorders, mental disorders, hypertension, asthma, and HIV/AIDS, are also being consumed to a lesser extent by minorities in comparison to Whites, resulting in lower drug spending among them. Chronic conditions such as diabetes, hypertension, obesity, and ESRD were found to be more prevalent in minorities leading to greater disability-related outcomes and poorer health status among minorities than Whites.

Our literature review has certain limitations. This paper is not a comprehensive compilation of all the studies reporting racial and ethnic disparities in the use of and spending on

prescription drugs and in health status. However, as we have mentioned before, our intent was to present a general pattern of such disparities among the Medicare, Medicaid and the general population, rather than present a comprehensive review. In addition, the disparities observed in our review could be affected by certain patient level characteristics other than race and ethnicity, such as socioeconomic status measures, geographic location, family structure, and so on. However, most studies have adjusted for some, if not all, of these variables, and have still found race and ethnicity to be significantly associated with health disparities. Finally, not many studies in our review have examined disparities in Hispanics, especially the ones before late 1990s. This could be due to the fact that Hispanics were categorized either as Whites, or “Other race” under certain surveillance methods at that time [65]. In a related limitation, there are very few studies documenting disparities in several other races, such as Asians, Native Americans, and so on. This could be due to factors such as unavailability, underreporting, and misreporting of race and ethnicity data.

Conclusion

In summary, the evidence from our literature review indicates disparities in the use of, and spending on prescription medications and in the health status and health states of racial and ethnic minorities in comparison to the majority White population. Moreover, these disparities are found in the Medicare, Medicaid, and the general population. Many regulations and legislations have been, and continue to be, designed and implemented to ensure equitable access to affordable health care while increasing the efficiency of health care delivery in the country. However, utilization-based provisions of some health policies and legislations, such as the MTM eligibility provisions under Medicare Part D, may have inherent disparity implications. Our review indicates that, in spite of suffering from poorer health outcomes, minorities utilize fewer prescription drugs and spend fewer resources on acquiring them. This makes it difficult to ensure equitable access to health care for all and, at the same time, ensure efficient allotment of resources to the provision of health care. Future policy-making decisions must consider all the available evidence on utilization of health care resources among all racial and ethnic groups to ensure that none of the policy provisions perpetuate racial and ethnic disparities.

Expert Commentary

The value of MTM services in managing chronic diseases and their treatments has been widely recognized in the scientific world. For example, the 2010 PPACA has acknowledged its importance in easing the burden on the Medicare system and stipulated modifications to their eligibility criteria. Apart from Medicare, state Medicaid programs and self-insured employers, too, offer MTM services to their enrollees. Thus, the policies and regulations implemented by CMS and PPACA for MTM services have a far reaching impact beyond the Medicare population.

Eliminating disparities in health care has received significant attention recently, as exemplified by the various federal policy initiatives implemented by the HHS and under the 2010 PPACA. The purpose of our review was to highlight the subtle and implicit forms of racial and ethnic disparities arising from predominantly value-based strategies, such as the MTM eligibility criteria. The predominantly utilization-based eligibility requirements for these services stand in contrast to the laudable emphasis on ensuring equitable distribution of health care resources and comprehensive coverage and ultimately, the complete elimination of racial and ethnic disparities from the health care system. The U.S. Census Bureau estimates that there would be significant increases in racial and ethnic diversity in the country in the next four decades, with the proportion of non-Hispanic Whites declining with a corresponding increase in the proportion of many racial and ethnic minorities, over

the same period [110]. Thus, if such disparities continue to exist, even at the current level, the burden to society from racial and ethnic disparities may be exacerbated in the coming decades. Although improvements are being made in bridging the gaps in care between all racial and ethnic groups in comparison to Whites, the ultimate goal of its complete elimination is still far from being achieved. It will require much more in-depth research in identifying the root causes and consequences of these disparities, additional interventions at the provider level, and more sophisticated monitoring for disparities by various public and private agencies to achieve that goal. Future research should continue to examine the true causes of racial and ethnic disparities and the measures that can effectively eliminate such disparities.

Five-Year View

In the next five years, the focus will continue to be on eliminating racial and ethnic disparities in health care with more and more studies focusing on identifying factors that were either previously overlooked or were unaccounted for to determine the root causes of such disparities. Specifically, more research will analyze the disparity implications of various federal and state regulations and legislations to identify institutionalized forms of disparities to ensure that the policymakers are better informed and are able to strike an equity-efficiency balance when evaluating and framing health care policies in the future.

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Key Issues

- Our review aimed to compile empirical evidence on the medication utilization and spending disparities, and differences in the health status and health conditions, between Whites and racial and ethnic minorities.
- This review found substantial disparities between White and minority Medicare beneficiaries with respect to medication use and health status with most of the studies documenting minorities using fewer drugs and incurring lower medication expenditures, despite having poorer health status.
- Among the Medicaid population, significant racial and ethnic differences, especially between African Americans and Whites, were found to exist in the use of and expenditures for prescription drugs, with many studies reporting disparities in the treatment of mental disorders and HIV/AIDS.
- Among the general population, significant racial and ethnic disparities have been noted overall, as well as in disease-specific prescription drug use and spending.
- The prevalence of certain chronic diseases was found to be greater in racial and ethnic minorities as compared to their White counterparts.
- Utilization-based eligibility criteria for certain important services, such as MTM services, may have inherent bias against racial and ethnic minorities because they use fewer medications and incur lower drug expenses compared to their White counterparts, despite being more likely to suffer from some of the most prevalent chronic conditions and having worse health status and health outcomes in comparison to Whites.
- In the next 5 years, research will continue to focus on the identification of the true causes of racial and ethnic disparities and on the elimination of these disparities.

Table 1

Studies documenting disparities in the Medicare population

Authors (Publication Year)	Study Endpoints	Data Source	Racial/Ethnic Groups Compared	Findings
Briesacher et al. (2003) ¹⁹	Drug coverage and use among Medicare beneficiaries with diabetes, hypertension or heart disease.	Medicare Current Beneficiary Survey (MCBS) data (1999).	Blacks, Hispanics, and Whites.	Blacks and Hispanics used 10–40% fewer drugs and had approximately 60% lower total drug costs compared to Whites.
Gaskin et al. (2006) ²⁰	Prescription drug spending and use among Medicare beneficiaries.	MCBS (1999).	Hispanics, non-Hispanic Blacks, and non-Hispanic Whites.	Blacks and Hispanics had lower total spending and out-of-pocket spending compared to Whites.
Phillips et al. (2002) ²¹	Prescription drug costs and their predictors among dually eligible enrollees in a Medicaid home- and community-based service (HCBS) program in Georgia.	Medicaid pharmacy claims data for dually eligible beneficiaries in Medicaid HCBS from four regions in Georgia (August 1996–July 1997).	African Americans, Whites, Hispanics, Asian and Others.	African Americans were found to incur significantly lower drug expenditures in comparison to Whites.
Schore et al. (2003) ²²	Prescription drug use among dually eligible Medicare beneficiaries in 10 U.S. States.	CMS' dually eligible beneficiary databases for 10 U.S. States (1995).	Blacks and Whites.	Blacks spent approximately 20% less per month on prescription drugs compared to Whites.
Schneider et al. (2002) ²³	Rates of beta-blocker use after myocardial infarction, breast cancer screening, eye examinations and follow-up visits for mental illness among Medicare managed care enrollees.	Health Plan Employer Data and Information Set (HEDIS) (1998).	Blacks, Hispanics, Whites and Others.	Black enrollees were less likely than Whites to receive beta-blockers.
Zuckerman et al. (2008) ²⁴	Differences in anti-dementia medication use among community-dwelling Medicare beneficiaries with dementia.	MCBS (2001–2003).	Non-Hispanic Blacks, non-Hispanic Whites, Hispanics, and Others.	Non-Hispanic Whites used approximately 30% greater anti-dementia drugs compared to other groups.
Poon et al. (2009) ²⁵	Use of and adherence to antihypertensive and dementia drugs among veterans aged 65 and over, diagnosed with hypertension and dementia.	2 national databases of the Veterans Health Administration (2000–2005).	African Americans, Hispanics and Whites.	Compared to Whites, African Americans were less likely to receive certain hypertension and dementia drugs, and Hispanics were less likely to receive certain hypertension drugs.
Gornick et al. (1996) ²⁶	Effects of race and income on mortality and use of Medicare services.	Medicare administrative data (1993) and Census data (1990).	Blacks and Whites.	The proportion of surgical procedures associated with poor management of chronic conditions such as

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				diabetes and end stage renal disease (ESRD), was greater among Blacks as compared to Whites.
McGinnis et al. (2003) ²⁸	Racial differences in survival among HIV-positive US veterans.	Veterans Aging Cohort 3-Site Study (1999–2002).	Blacks, Hispanics and Whites.	Black and Hispanic veterans had higher mortality rates and greater number of medical comorbidities compared to Whites.
Newsome et al. (2008) ²⁹	Racial differences in the rate of progression to ESRD and mortality among Medicare beneficiaries.	Cooperative Cardiovascular Project data (1994–2004).	African Americans and Whites.	African Americans were found to be at a significantly greater risk of developing ESRD compared to Whites at varying eGFR levels.
Ciol et al. (2008) ³⁰	Disability-related outcomes such as mobility limitation, difficulty in six activities of daily living (ADLs) and six instrumental activities of daily living (IADLs) among Medicare beneficiaries.	MCBS (1992–2004).	Native Americans, Asian, Black, Hispanic-Whites, non-Hispanic Whites and others.	Despite a slight overall decrease in the ADL and IADL disability during this period, racial and ethnic disparities in disability outcomes persisted, especially Black-White disparities.
Whitson et al. (2011) ³¹	Disparities between black and white elderly in disability rates, controlling for demographic and socioeconomic factors.	Duke Established Populations for Epidemiologic Studies of the Elderly (1986–1990).	Blacks and Whites.	Higher rates of obesity and diabetes mellitus in Blacks contributed to more than 30% excess disability in them in comparison to Whites, with Blacks having a greater likelihood of being obese compared to Whites.

Table 2

Studies documenting disparities in the Medicaid population

Authors (Publication Year)	Study Endpoints	Data Source	Racial/Ethnic Groups Compared	Findings
Kotzan et al. (1989) ³²	Influence of age, sex, and race on prescription drug use among a sample of Georgia Medicaid enrollees.	Georgia Medicaid Prescription Claims Data (1985).	Whites and non-Whites.	Whites used a higher mean number of prescriptions when compared to non-Whites; the difference in utilization increased with increasing age.
Khandker et al. (1998) ³³	Prescription drug use and spending among black and white enrollees.	Medicaid Statistical Information System (MSIS) data from Georgia (1992).	Blacks and Whites.	Black children, adults, and elderly, all used fewer prescription drugs compared to their White counterparts. Drug spending was higher among Whites compared to Blacks.
Zito et al. (2002) ³⁴	Disparities in the use of psychotropic medications between Black and White youths.	Computerized claims for youths enrolled in a mid-Atlantic state Medicaid program (2000).	Whites, Blacks and Others.	White-Black disparities were significant and varied for different Medicaid eligibility categories.
Depp et al. (2008) ³⁵	Difference by age, gender and race/ethnicity in the prevalence of using antipsychotics and mood stabilizers for bipolar disorder treatment.	California's Medical database for Medicaid enrollees (2001–2004).	African Americans, non-Latino Whites and Latinos.	African Americans and Latinos were less likely than non-Latino Whites to receive antipsychotics or mood stabilizers.
Horvitz-Lennon et al. (2009) ³⁶	Racial and ethnic disparities in spending on psychotropic drugs, inpatient services, all mental health, and all general health services.	Administrative claims data from the Florida Medicaid program (1995–2006).	Blacks, Latinos and Whites.	Significant Black-White and Hispanic-White disparities in spending on psychotropic drugs were observed.
Crystal et al. (2001) ³⁷	The association of initiation and persistence of newer antiretroviral treatments with any patient characteristics.	Administrative claims data and HIV/AIDS surveillance data from the New Jersey Medicaid program (1998).	African Americans, Whites and Hispanics.	African Americans and Hispanics experienced delay in treatment initiation compared to Whites, along with less-consistent use of the newer antiretroviral treatments after the first prescription among minorities.
King et al. (2008) ³⁸	Disparities in the rates of highly active antiretroviral therapy (HAART).	Medicaid claims data of five states (1998).	Non-Hispanic Blacks, non-Hispanic Whites and Hispanics.	Non-Hispanic Blacks and Hispanics were found to have significantly lower likelihood of receiving HAART compared to non-Hispanic Whites.

Authors (Publication Year)	Study Endpoints	Data Source	Racial/Ethnic Groups Compared	Findings
Lieu et al. (2002) ³⁹	Racial/ethnic variation in asthma status and management practices among children in managed Medicaid.	American Academy of Pediatrics (AAP) Children's Health Survey for Asthma (2002).	Blacks, Latinos and Whites.	Despite having worse asthma status, Black and Latino children were less likely to use asthma-preventing medications than were Whites.
Shaya et al. (2005) ⁴⁰	Association of race with the likelihood of being prescribed selective cyclooxygenase-2 inhibitors (COX-2) versus any other nonsteroidal anti-inflammatory agents (NSAID).	Data on enrollees from a mid-Atlantic state's Medicaid managed care organizations (2000–2002).	African Americans, Whites, Asians, Hispanics, Native Americans and Other or unknown.	African Americans along with other races had a lower likelihood of being prescribed a COX-2 as compared to Whites.
Litaker et al. (2006) ⁴¹	Disparities in cardiovascular disease prevention with respect to the use of lipid-lowering agents.	Pharmacy claims data from the Ohio Medicaid program (1992–1999).	Racial/Ethnic minorities and Whites.	Younger minority adults (<60 years) were less likely to be either previous users, new users, or long-term users of lipid-lowering agents compared to Whites.

Table 3

Studies documenting disparities in the general population

Authors (Publication Year)	Study Endpoints	Data Source	Racial/Ethnic Groups Compared	Findings
Chen and Chang (2002) ⁴²	Factors that influence utilization of prescription drugs in the pediatric population.	Medical Expenditure Panel Survey (MEPS) (1996).	Asians, Blacks, Hispanics, Native Americans, Whites and Others.	Black children had a lower likelihood of receiving prescription drugs compared to White children; Black, Hispanic and Asian children had lower expenditures compared to their White counterparts.
Wang et al. (2006) ⁴³	Racial and ethnic disparities in essential new drug use.	MEPS (1996–2001).	Hispanics, non-Hispanic Blacks, and non-Hispanic Whites.	Blacks used fewer essential new medications compared to Whites; no statistically significant Hispanic-White disparities were observed.
Wang et al. (2007) ⁴⁴	Racial and ethnic disparities in new prescription drug use.	MEPS (1996–2001).	Non-Hispanic Blacks, Hispanics and non-Hispanic Whites.	Compared to Whites, Blacks used fewer new prescription drugs; no statistically significant Hispanic-White disparities were observed.
Chen et al. (2010) ⁴⁵	Disparities in the use and expenditure for prescription drugs between Latinos and Whites.	MEPS (1999–2006).	Latinos (Puerto Ricans, Mexicans, Cubans, Central/South Americans, and other Latinos) and Whites.	Compared to Whites, Latinos were significantly less likely to use prescription drugs. Among the subgroups, Puerto Ricans were the most likely and Cubans were the least likely to use prescribed drugs. Whites also had significantly higher drug expenditures compared to Latinos.
Smith et al. (1999) ⁴⁶	Relationship between use of antiretroviral and pneumocystis carinii pneumonia (PCP) medications with access to medical care.	AIDS Costs and Services Utilization Survey (ACSUS) data (1991–1992).	Non-Hispanic African Americans, non-Hispanic Whites, Hispanics and Others.	Non-Hispanic African Americans and Hispanics had a higher likelihood of receiving antiretroviral medications than Whites and had no statistically significant difference in the likelihood of receiving PCPs.
Gebo et al. (2005) ⁴⁷	Racial and gender disparities in the receipt of HAART in a sample of HIV patients.	10 U.S. HIV primary care sites in the HIV Research Network (HIVRN) (2001).	African-Americans, Whites, Hispanics and Others.	African Americans had a lower likelihood of receiving HAART compared to Whites.

Authors (Publication Year)	Study Endpoints	Data Source	Racial/Ethnic Groups Compared	Findings
Han et al. (2005) ⁴⁸	Disparities in the use of psychiatric drugs between Whites and Blacks, Hispanics, and Asian Indians.	MEPS (1996–2000).	Blacks, Hispanics, Asian-Indians and Whites.	Compared to Whites, Blacks, Hispanics and Asian Indians were all less likely to use prescription drugs for mental illnesses. Difference in prescription expenditures between Blacks and Whites was statistically significant.
Wang et al. (2007) ⁴⁹	The economic implications of racial and ethnic disparities in use of selective serotonin reuptake inhibitors (SSRI).	MEPS (2002 & 2003).	Non-Hispanic Whites, non-Hispanic Blacks and Hispanic Whites.	Non-Hispanic Whites used a higher number of SSRIs when compared to non-Hispanic Blacks and Hispanic Whites. Non-Hispanic Blacks and Hispanic Whites had a lower likelihood of using SSRIs compared to non-Hispanic Whites.
Gonzalez et al. (2008) ⁵⁰	Racial disparities in the use of antidepressants.	National Institute of Mental Health's Collaborative Psychiatric Epidemiology Surveys (CPES) (2001–2003).	Blacks and Whites.	Compared to depressed White respondents, depressed Black respondents had significantly lower odds of using antidepressants.
Winters et al. (2010) ⁵¹	Influence of race and health insurance on prescription medication use and expenditures.	Data on 18–64 years old individuals with a cardiovascular disease from MEPS (1996–2003).	African Americans, European Americans, Hispanic Americans and Others.	African Americans, Hispanic Americans, and persons of other races, filled significantly fewer number of prescriptions and had lower annual prescription medication expenses compared to European Americans.
Brancati et al. (2000) ⁵²	Racial and ethnic differences in the incidence of type-2 diabetes.	Atherosclerosis Risk in Communities (ARIC) study (1986–1989).	African Americans and Whites.	Incidence rate of diabetes was approximately 2.4 times greater in African American women, and 1.5 times greater in African American men, compared to their White counterparts. African American men and women had higher blood pressures prior to the onset of diabetes, compared to their White counterparts.
Kramer et al. (2004) ⁵³	Relationship between race and ethnicity and	Multi-Ethnic Study of Atherosclerosis	Whites, African Americans, Chinese, and Hispanics.	African Americans and Chinese had a higher likelihood of

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	hypertension and its treatment.	(MESA) study (2000–2002).		having hypertension. African Americans were more likely to have uncontrolled hypertension, even after being treated for it.
Hoffman et al. (2001) ⁵⁴	Racial and ethnic differences in advanced-stage prostate cancer.	Medical record abstracts and self-administered survey responses from the Prostate Cancer Outcomes Study (1994–1995).	Non-Hispanic Whites, African Americans and Hispanics.	Clinically advanced-stage prostate cancers were detected more frequently in African-Americans and Hispanics than in non-Hispanic whites.
Li et al. (2003) ⁵⁵	Evaluate the relationship between race and ethnicity and breast cancer stage, treatments, and mortality rates.	Surveillance, Epidemiology, and End Results Program (1992–1998).	Asian or Pacific Islanders, Asians, Blacks, Hispanic Whites, and non-Hispanic Whites.	Racial and ethnic minorities had a greater likelihood of presenting with an advanced stage of breast cancer compared to Whites.
Hayes et al. (2011) ⁵⁶	Disparities in health related quality of life (HRQOL) among adults with self-reported coronary heart disease.	Behavioral Risk Factor Surveillance System state-based telephone survey (2007).	Non-Hispanic Whites, non-Hispanic Blacks, Hispanics, Asians, Native Americans, and Others.	Compared to non-Hispanic Whites, Hispanics were more likely to report fair to poor health status, while Native Americans were more likely to report greater number of unhealthy and activity-limited days.
Carpenter et al. (2011) ⁵⁷	Racial disparities in health status, HRQOL and activity limitations among individuals with arthritis who have access to primary care physicians.	North Carolina Health Project (2005 & 2008).	Blacks, Latinos and Whites.	Latinos were more likely to report fair/poor health status and fewer activity limitations than Whites or Blacks.