# Medication Access and Healthcare Utilisation among Medicare Beneficiaries

Racial and Ethnic Disparities in the 2013 and 2020 MCBS

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May 2023

**Abstract**

This paper examines racial and ethnic differences in medication access and healthcare service utilisation among Medicare beneficiaries using the 2013 and 2020 Medicare Current Beneficiary Survey public-use files. Survey-weighted chi-square tests and multivariable logistic regressions compare outcomes across groups, adjusting for demographic and socioeconomic characteristics, chronic conditions, self-assessed health, and insurance coverage. The analysis also considers interactions between race or ethnicity and selected covariates. Disparities in medication access and outpatient service use persist after adjustment. Satisfaction outcomes evolve differently across groups, with Hispanic beneficiaries showing less favourable adjusted satisfaction in 2020. Income, health status, and chronic conditions remain closely associated with medication cost-coping behaviours and service utilisation. The results describe associations across two survey years rather than causal effects. They motivate attention to information about coverage, the affordability of medication, and differences in healthcare experiences across population groups.

**Keywords:** Medicare; medication access; healthcare utilisation; racial and ethnic disparities; MCBS.

## 1 Introduction

The Medicare insurance program is the United States most extensive public-run insurance system and is available to all Americans above 65 or with specific chronic conditions. Though it underwent several reforms and contributed positively to Medicare-aged Americans' overall health insurance coverage rate, it is still under criticism due to persisting inequalities among beneficiaries. As COVID-19 hit the United States, ethnicity and socio-economic conditions proved to be major drivers of inequalities in terms of healthcare service utilization and access to medication. Therefore, the main object of this study is to assess the relations of association between these metrics and ethnicity at the beginning of the pandemic and to compare them with older data to see the evolution. Furthermore, it attempts to analyze the potential interaction effects between ethnicity-related variables and relevant covariates for the year 2020.

## 2 Related literature

As the COVID-19 pandemic hit the United States in 2020, the issue of protecting the health of older people and of those suffering from chronic conditions soon became a national priority.

Recent data from the U.S. Census Bureau have shown that, though the U.S. population is still growing, the share of Americans that are now 65 and older rose by nearly a third between 2010 and 2020 [1]. While age does not necessarily have a significant influence on health outcomes following a COVID-19 infection, comorbidities associated with it tend to have a strong influence on disease severity [2]. Therefore, the need for older Americans to benefit from proper health insurance coverage is now more important than ever.

The U.S. government attempted to tackle this issue as early as 1965 with the implementation of the Medicare program, their largest public Health program, which helped nearly all Americans that are 65 and older get basic health coverage by the 1970s [3]. However, this program has been at the center of many a controversy over its nearly 60 years of existence despite several reforms.

A recurrent issue that has been brought to the fore once again during the pandemic is that of significant discrepancies in access to care and service utilization between Medicare beneficiaries, especially in relation to race. In terms of access to care, studies have found that factors such as race or income level had a significant effect on factors such as hospital discharges or visits to physicians [4]. Access to medication more specifically has been the focus of several studies which showed that one's race, income or starting health status have a major impact on a given beneficiary's likelihood of engaging in cost-coping behaviors or his satisfaction with his drug plan [5][6]. This question of prescription drugs is a vital component of access to care as it has been proven that those that suffer from chronic conditions who had access to medications benefitted from a significantly longer lifespan [7], notably for diseases like diabetes [8]. Even though programs such as Medicare Part D or Medicaid helped increase the likelihood of Americans having drug coverage [9], this did not suffice to bridge inequalities in access to drugs between the neediest individuals [10]. All of this makes medication access a major health issue for seniors during and outside the pandemic.

In the current context, the question of service utilization has also gained momentum, especially due to COVID-19 as ethnic minorities and beneficiaries with chronic conditions have been found to experience significantly higher rates of COVID-19-related hospitalization [11]. Similarly, racial and ethnic disparities in the level and nature of COVID-19 outpatient treatments have also been highlighted in recent reports from the U.S. Center for Disease Control and Prevention [12]. However, as was observed with access to medication, these differences are not limited to COVID-1919 and are the reflection of preexisting inequalities. Ethnicity-based discrepancies in healthcare utilization among Medicare enrollees are indeed well documented [13][14] and tend to be amplified by other forms of socio-economic inequalities such as gender [15], income [16] or age [17]. For instance, an individual's net worth contributes significantly to his chances of rating his health status as poor or fair within each ethnic group [18], though factors such as education tend to have a mitigating effect on the strength of this association. In general, service utilization levels are strongly associated with health outcomes, notably when looking at changes in the probability of death [19] and provide important information on health inequalities in addition to access to care [20].

Lastly, many recent studies have pointed out the issue of the diversification of types of health insurance coverage for Medicare beneficiaries. Indeed, the standard Medicare formula, also called Medicare Fee For Service, has been flagged multiple times for its high level of copayments and out-of-pocket costs which still reached around 3024$ per year and per beneficiary in 2017 [21]. To mitigate these costs, many Medicare beneficiaries have turned to alternative solutions such as Medicare Advantage [22] or, to a lesser extent, to supplemental private insurance plans such as Medigap plans [23]. Nonetheless, this multiplication/diversification of

Medicare-associated health care plans has also been linked to several new issues for Medicare beneficiaries. In the case of Medigap, studies have pointed out that enrollees in this type of program are subject to noteworthy levels of moral hazard and adverse selection [24][25][26] due to greater plan generosity, which may have a substantial effect on important components of service utilization such as the level of inpatient stay [27]. Therefore, though this question is not at the center of this study, the effect of the type of plan cannot be neglected when considering service utilization and is thus considered.

These discrepancies regarding service utilization, access to care, and plan generosity have concrete implications in terms of public policy and call for an actualization of our understanding of them using post-COVID-19 data. Therefore, this study aims at providing an actualized overview of racial/ethnic discrepancies in terms of access to care and service utilization among Medicare Beneficiaries at the beginning of the COVID-19 pandemic in 2020. This includes critically reviewing previous results obtained in 2013 and comparing them to 2020 data. In accordance with prior studies, this study adjusts for socio-economic factors (income, gender, education level), health factors (chronic conditions, health status), and type of health insurance coverage. This last covariate is essential to correct for the effect of adverse selection and moral hazard on service utilization observed in more recent studies as mentioned above. Besides, this study investigates existing interaction effects between covariates in order to look for potential mediating effects of ethnicity on other preexisting discrepancies, which is a problem very few studies have tackled before.

## 3 Data and methods

The database used for the purpose of this study is the 2020 Medicare Current Beneficiary Survey Public Use File (PUF). This is a "multipurpose survey of a nationally representative sample of the Medicare population" [28] which is carried out by the Office of Enterprise Data and Analytics of the Centers for Medicare & Medicaid Services (CMS). This survey provides extensive data about a given respondent's socio-economic situation (income, education, marital status, living arrangement), starting health situation (self-assessed health status and chronic conditions such as Diabetes, Alzheimer, COPD...) or type of insurance coverage (Medicare Advantage, employer-sponsored, private insurance, Medicaid dual enrollment). Besides, it includes a variety of indicators for access to medication (satisfaction with a current drug plan, presence of cost-coping behaviors) as well as for healthcare utilization (inpatient, outpatient, skilled nursing facilities user rate).

The total number of respondents is 13,916, however, since this study focuses on age-eligible Medicare beneficiaries, the population is restricted to individuals who are 65 years old and above (n = 11,587). In the case of variables linked to medication access, this study focuses on individuals belonging to the MCBS summer subsection (n = 8,394) and excludes Medicare beneficiaries with no drug coverage for some dependent variables ("satisfaction with finding pharmacy" and "satisfaction with drug list").

This study uses race/ethnicity as the main independent variable to categorize individuals between non-Hispanic whites (n = 10,266), non-Hispanic blacks (1,393), Hispanics (1,418). This is mostly due to the fact that information regarding socioeconomic status (SES) variables used to be much harder to access, which lead several of the early studies conducted in this field to consider this variable as a proxy for SES variables [29]. Nonetheless, the wide majority of recent studies have demonstrated that SES and ethnicity variables have separate effects on healthcare and now also include these variables as controlling variables. This is the approach chosen for

this study. The main SES variables used in this study are education level and income level. Other controlling variables are Age, Gender, Chronic conditions (such as Diabetes, Cancer, Depression, and High blood pressure), and Health status. The latter is self-assessed by the respondent. Lastly, this study controls for the type of insurance coverage of beneficiaries in two separate ways: For access to care, which is centered on access to prescription drugs, it separates individuals based on whether they receive prescription drug coverage from 1)a private insurance plan, 2)a Medicare Advantage plan, 3) Medicare Part D, or from 4) Medicaid. Beneficiaries with no prescription drug coverage plan are grouped under the "No Coverage" category. For service utilization, it relies on a different decomposition which differentiates between individuals getting their health coverage from 1) a private supplemental insurance plan (Medigap or Employer-sponsored), 2) Medicaid, 3) Medicare Advantage or 4) Medicare Fee For Service (Medicare FFS, which is the traditional Medicare formula). The second definition employed for Medicare Advantage and Private insurance is broader than the one used for access to medication variables, since it comprises individuals who receive their health insurance from these plans but do not necessarily benefit from prescription drug coverage.

Regarding dependent variable: this study relies on two main constructs which regroup several dependent variables. The first construct is "access to care" and focuses on access to medication. The dependent variables associated with this construct are 1) the satisfaction of a beneficiary with the amount he or she pays for prescription drugs, 2) his or her satisfaction with the list of drugs covered by his or her drug plan, 3) his or her satisfaction with the ease of finding a pharmacy that accepts his or her drug plan, 4) the likelihood of a beneficiary resorting to cost-coping behaviors. The latter is split into two separate variables 1) one's likelihood to forgo filling a prescription, and 2) one's likelihood of skipping doses or taking smaller doses than recommended to save on costs. This decomposition is mostly based on two studies realized in 2019 and 2017 respectively (Pollack, 2019 and Deborah A.Taira, 2017). The latter used the MCBS PUF 2013 access to care file and was critically replicated to ensure the relevance of this study. The second and last construct is "service utilization" and comprises three distinct variables, which are 1) outpatient service utilization, 2) inpatient service utilization, 3) skilled nurse facility utilization.

The statistical analysis performed in this study is divided into two main steps. Firstly, Chi-Square tests are used to get more information on demographic characteristics, access to care, and service utilization variables in relation to ethnic categories. This first part aims at providing a solid overview of the 2013 and 2020 databases and looks at the evolution of the characteristics of respondents in each ethnic category.

The second method used, which is at the core of this study, consists in several multivariable logistic regressions to look at 1) the nature and strength of associations between independent variables and each of the dependent variables, and observe 2) their evolution through comparing 2013 and 2020 data.

Both the Chi-Square tests and the multivariable logistic regressions are carried out using Stata V.17. Results are adjusted for sampling variability through balanced repeated replication (BRR) using the sets of sampling weights provided by the MCBS PUF. It Is worth noting, for the 2020 dataset, that the set of sampling weights used in the case of access to medication variables is the "summer weights" set, whereas the one used for service utilization variable is the "fall weights" set. While results focus primarily on direct links of association as interpreting interaction terms can be arduous in the case of logistic regressions [30][31]... this study also looks into interaction terms in relation to ethnicity in order to identify potential moderating effects of this variable on the impact of covariates. Lastly, it is worth noting that the data used in this survey is de-

identified and some variables have been excluded from this study due to limited access under the MCBS's new privacy policy.

## 4 Results

### 4.1 Population characteristics by race and ethnicity

#### *4.1.1 Socioeconomic characteristics*

Comparing MCBS data from year 2013 (see Table 1) and 2020 (see Table 2), no significant evolution in differences between ethnic groups can be observed for gender, age, income and education variables. For both years, non-Hispanic whites are more likely to be above 75 than their non-white and Hispanic counterparts [45.5% against 42% and 43.1% for 2013, and 41.1% against 37.7% and 35.7% for 2020, P-val <0.001]. A similar observation can be made regarding income given that the share of non-Hispanic white beneficiaries with revenues below $25,000 is significantly lower than for beneficiaries from other ethnic groups [30.8% against 59.6% and 68.5% for 2013, and 18.3% against 50.8% and 58.6% for 2020, P-val <0.001]. It is worth noting that while the overall proportion of beneficiaries having revenues lower than $25,000 annually has dropped for all categories, this fall has been uneven across ethnicities [-12.5 percentage points for non-Hispanic whites against -8.8 and -9.9]. Lastly, education appears as another major point of difference, with non-Hispanic black and Hispanic beneficiaries exhibiting lower rates of post-secondary education compared to non-Hispanic white beneficiaries [32.9% and 26.1% against 50.4% for 2013, and 41.5% and 34.8% against 34.8% for 2020, P-val <0.001]. As with income discrepancies, an overall positive evolution is witnessed across all racial categories, however the rise in higher education rates appears to be higher for non-Hispanic white beneficiaries, adding to the divide witnessed for the year 2013.

**Table 1:** Socioeconomic characteristics by race/ethnicity, 2013

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Gender* | | | | |
| male | 0.447 | 0.408 | 0.437 | 0.0669 |
| female | 0.553 | 0.592 | 0.563 | |
| *Age* | | | | |
| Age 65-74 | 0.545 | 0.58 | 0.569 | <0.001 |
| Age 75+ | 0.455 | 0.42 | 0.431 | |
| *Income* | | | | |
| income <$25,000 | 0.308 | 0.596 | 0.685 | <0.001 |
| *Education* | | | | |
| Less than high school | 0.131 | 0.343 | 0.501 | <0.001 |
| High school graduate | 0.364 | 0.328 | 0.238 | |
| More than high school | 0.504 | 0.329 | 0.261 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2013 access-to-care file.

**Table 2:** Socioeconomic characteristics by race/ethnicity, 2020

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Gender* | | | | |
| male | 0.449 | 0.426 | 0.404 | 0.1002 |
| female | 0.551 | 0.574 | 0.596 | |
| *Age* | | | | |
| Age 65-74 | 0.589 | 0.623 | 0.643 | <0.001 |
| Age 75+ | 0.411 | 0.377 | 0.357 | |
| *Income* | | | | |
| income <$25,000 | 0.183 | 0.508 | 0.586 | <0.001 |
| *Education* | | | | |
| Less than high school | 0.06 | 0.238 | 0.457 | <0.001 |
| High school graduate | 0.288 | 0.348 | 0.195 | |
| More than high school | 0.652 | 0.415 | 0.348 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2020 public-use file, summer weights.

#### *4.1.2 Health and chronic conditions*

Regarding chronic conditions, some notable changes can be seen between 2013 (see Table 3) and 2020 (see Table 4). The differences observed in 2013 between ethnic groups regarding the proportion of beneficiaries with cancer or depression appear to be significantly less marked for 2020 [P-val <0.001 for both cancer and depression in 2013, and P-val of 0.1688 and 0.007 respectively in 2020]. For cancer, this narrowing of the gap between ethnicities is driven mainly by an increase in observed cancer rates for minority groups and a decrease for non-Hispanic whites [-1.5 percentage points for the latter, against +0.012 and 0.02 for non-Hispanic blacks and Hispanics respectively]. Other chronic condition does not show a major) evolution in differences between races, with non-Hispanic whites remaining significantly less likely than others to suffer from high blood pressure [66.1% against 83.3% and 70.3% in 2013, and 61.3% against 80.1% and 63.2% in 2020, P-val <0.001] or from diabetes [25.6% against 39.4% and 35.6% in 2013, and 25.8% against 43% and 45.8% in 2020, P-val <0.001]. In addition, while there remain limited discrepancies between ethnic groups regarding the proportion of people with high cholesterol, a growing gap in favor of non-Hispanic whites can be observed for the year 2020 [P-val of 0.9998 for 2013 against 0.0012 for 2020], along with a general rise across all ethnic groups.

Lastly, the rate of beneficiaries deeming their health status to be good or above is markedly higher in 2020. Nonetheless, the divide between non-Hispanic white beneficiaries and other beneficiaries persists in 2020.

**Table 3:** Health characteristics by race/ethnicity, 2013

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Chronic conditions* | | | | |
| High blood pressure | 0.661 | 0.833 | 0.703 | <0.001 |
| high cholesterol | 0.587 | 0.587 | 0.587 | 0.9998 |
| diabetes | 0.256 | 0.394 | 0.356 | <0.001 |
| heart disease | 0.112 | 0.096 | 0.085 | 0.0219 |
| COPD/asthma/emphysema | 0.183 | 0.158 | 0.165 | 0.1462 |
| heart failure | 0.069 | 0.081 | 0.062 | 0.2818 |
| depression | 0.218 | 0.158 | 0.261 | <0.001 |
| cancer | 0.209 | 0.166 | 0.14 | <0.001 |
| *Self-assessed health* | | | | |
| excellent | 0.209 | 0.129 | 0.145 | <0.001 |
| very good | 0.351 | 0.245 | 0.203 | |
| good | 0.279 | 0.347 | 0.334 | |
| fair | 0.118 | 0.229 | 0.246 | |
| poor | 0.042 | 0.05 | 0.072 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2013 access-to-care file.

**Table 4:** Health characteristics by race/ethnicity, 2020

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Chronic conditions* | | | | |
| High blood pressure | 0.613 | 0.801 | 0.632 | <0.001 |
| high cholesterol | 0.628 | 0.691 | 0.705 | 0.0012 |
| diabetes | 0.258 | 0.43 | 0.458 | <0.001 |
| heart disease | 0.086 | 0.084 | 0.071 | 0.4959 |
| COPD/asthma/emphysema | 0.17 | 0.165 | 0.139 | 0.2647 |
| heart failure | 0.051 | 0.077 | 0.034 | 0.0042 |
| depression | 0.221 | 0.166 | 0.252 | 0.007 |
| cancer | 0.194 | 0.178 | 0.16 | 0.1668 |
| *Self-assessed health* | | | | |
| excellent | 0.213 | 0.092 | 0.146 | <0.001 |
| very good | 0.41 | 0.294 | 0.245 | |
| good | 0.257 | 0.384 | 0.32 | |
| fair | 0.1 | 0.183 | 0.238 | |
| poor | 0.021 | 0.047 | 0.05 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2020 public-use file, summer weights.

### *4.1.3 Health-insurance coverage*

**Prescription-drug coverage** The main significant gap between 2013 (see Table 5) and 2020 (see Table 6) is observed for beneficiaries receiving prescription coverage through a private insurance plan (either self-sponsored or employer-sponsored). Indeed, the proportion of Hispanic beneficiaries in this situation has risen sharply while it remained stable for others, dwindling the discrepancy observed between this racial category and others for 2013 [12.4% against 25.6% and 22.4% in 2013 with P-val<0.001, and 17.3% against 25.2 and 20.9 in 2020 for P-val of 0.0084]. Nonetheless, non-Hispanic whites are still significantly more likely to receive drug coverage from a Medicare Part D plan [25.6% against 14.5% and 11.3% in 2013, and 26.7% against 9% and 7.7% in 2020, P-val<0.001] and significantly less likely to receive it via a Medicare advantage plan [29.2% against 33.2% and 48.5% in 2013, 36.9% against 57.5% and 59.4% in 2020, P-val <0.001]. It is worth noting that the proportion of beneficiaries getting prescription drug coverage through a Medicare Advantage plan has seen a major increase regardless of the ethnic group [+7.7 percentage points, +24.3 percentage points, and +10.9 percentage points]. In addition, in accordance with recent studies on the level of prescription drug coverage, the proportion of beneficiaries without drug coverage has dropped for every racial category between 2013 and 2020. Lastly, Non-Hispanic blacks and Hispanics are even more likely to benefit from Medicaid dual coverage than non-Hispanic whites when comparing 2013 and 2020 data [26.6% and 28% against 7% in 2013, 29.4% and 40% against 5.5% in 2020, P-val<0.001].

**Table 5:** Prescription-drug coverage by race/ethnicity, 2013

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| Medicare Part D | 0.256 | 0.145 | 0.113 | <0.001 |
| Private | 0.256 | 0.224 | 0.124 | <0.001 |
| Medicare advantage | 0.292 | 0.332 | 0.485 | <0.001 |
| Medicaid coverage | 0.07 | 0.266 | 0.28 | <0.001 |
| No drug coverage | 0.155 | 0.14 | 0.11 | 0.006 |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2013 access-to-care file.

**Table 6:** Prescription-drug coverage by race/ethnicity, 2020

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| Medicare Part D | 0.267 | 0.09 | 0.077 | <0.001 |
| Private | 0.252 | 0.209 | 0.173 | 0.0084 |
| Medicare advantage | 0.369 | 0.575 | 0.594 | <0.001 |
| Medicaid coverage | 0.055 | 0.294 | 0.407 | <0.001 |
| No drug coverage | 0.115 | 0.086 | 0.068 | 0.0124 |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2020 public-use file, summer weights.

**Overall health coverage** As coverage of Inpatient, outpatient, and skilled nursing facility services is not dependent on prescription drug coverage, individuals are also compared based on their type of health insurance coverage irrespective of whether their insurance plan covers pre-

scription drugs or not. A few minor discrepancies can be observed between 2013 (see Table 7) and 2020 (see Table 8): The proportion of beneficiaries enrolled in a Medicare Advantage plan has increased, irrespective of the ethnic group [+7 percentage points, +19 and + 7.9 percentage points]. Conversely, the proportion of beneficiaries with only the traditional Medicare FFS has dropped slightly across all ethnic groups. Lastly, while the proportion of non-Hispanic white beneficiaries with Medicaid dropped slightly, for Hispanics it rose by over 10 percentage points.

**Table 7:** Health-insurance coverage by race/ethnicity, 2013

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| Private | 0.58 | 0.372 | 0.256 | <0.001 |
| Medicare advantage | 0.311 | 0.371 | 0.508 | <0.001 |
| Medicaid coverage | 0.07 | 0.266 | 0.28 | <0.001 |
| Medicare FFS | 0.134 | 0.164 | 0.139 | 0.0715 |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2013 access-to-care file.

**Table 8:** Health-insurance coverage by race/ethnicity, 2020

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| Private | 0.596 | 0.327 | 0.277 | <0.001 |
| Medicare advantage | 0.381 | 0.561 | 0.587 | <0.001 |
| Medicaid coverage | 0.061 | 0.289 | 0.381 | <0.001 |
| Medicare FFS | 0.096 | 0.104 | 0.089 | 0.7133 |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2020 public-use file, fall weights.

### 4.2 Medication access: unadjusted results

Levels of satisfactions have risen noticeably between 2013 (see Table 9) and 2020 (see Table 10) for non-Hispanic whites and non-Hispanic blacks when it comes to amount paid [+13.3 percentage points and +12.8 percentage points], drug list covered by their health insurance plan [+7.4 percentage points and +9.3 percentage points] and finding a pharmacy that accepts their drug plan [+5.2 percentage points and +10.5 percentage points]. Hispanic beneficiaries, however, show slumping satisfaction levels for drug lists [-8 percentage points] and for capacity to find a pharmacy [-12.7 percentage points]. Overall, non-Hispanic whites exhibit higher levels of satisfaction than others regardless of the variable observed [Pval<0.001], though the divide between them and non-Hispanic blacks shrunk while the one between non-Hispanic whites and Hispanics widened.

Lastly, while all ethnic groups are less likely to engage in cost-coping behaviors that involve taking a smaller dose or skipping a dose to save on medication costs, there is a growing number of individuals who choose not to fill a prescription due to costs.

**Table 9:** Medication access by race/ethnicity, 2013

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Satisfaction with amount paid* | | | | |
| very satisfied | 0.291 | 0.206 | 0.276 | <0.001 |
| satisfied | 0.552 | 0.623 | 0.525 | |
| dissatisfied | 0.127 | 0.135 | 0.161 | |
| very dissatisfied | 0.03 | 0.035 | 0.039 | |
| *Satisfaction with drug list* | | | | |
| very satisfied | 0.297 | 0.209 | 0.299 | <0.001 |
| satisfied | 0.626 | 0.738 | 0.614 | |
| dissatisfied | 0.065 | 0.045 | 0.077 | |
| very dissatisfied | 0.012 | 0.008 | 0.009 | |
| *Satisfaction with finding a pharmacy* | | | | |
| very satisfied | 0.515 | 0.327 | 0.414 | <0.001 |
| satisfied | 0.475 | 0.664 | 0.574 | |
| dissatisfied | 0.007 | 0.008 | 0.011 | |
| very dissatisfied | 0.002 | 0.001 | 0.001 | |
| *Did not fill a prescription due to costs* | | | | |
| often | 0.005 | 0.007 | 0.005 | 0.8651 |
| sometimes | 0.028 | 0.033 | 0.028 | |
| never | 0.967 | 0.96 | 0.967 | |
| *Took a smaller dose due to costs* | | | | |
| often | 0.007 | 0.01 | 0.008 | 0.8279 |
| sometimes | 0.038 | 0.032 | 0.036 | |
| never | 0.955 | 0.958 | 0.956 | |
| *Skipped a dose due to costs* | | | | |
| often | 0.009 | 0.015 | 0.005 | 0.1078 |
| sometimes | 0.058 | 0.064 | 0.074 | |
| never | 0.934 | 0.921 | 0.92 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2013 access-to-care file.

**Table 10:** Medication access by race/ethnicity, 2020

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| *Satisfaction with amount paid* | | | | |
| very satisfied | 0.424 | 0.334 | 0.31 | <0.001 |
| satisfied | 0.472 | 0.577 | 0.595 | |
| dissatisfied | 0.079 | 0.066 | 0.076 | |
| very dissatisfied | 0.026 | 0.023 | 0.019 | |
| *Satisfaction with drug list* | | | | |

*Continued on next page*

*Table 10 (continued)*

| Characteristic | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| very satisfied | 0.371 | 0.302 | 0.219 | <0.001 |
| satisfied | 0.575 | 0.661 | 0.739 | |
| dissatisfied | 0.044 | 0.03 | 0.039 | |
| very dissatisfied | 0.01 | 0.006 | 0.004 | |
| *Satisfaction with finding a pharmacy* | | | | |
| very satisfied | 0.567 | 0.432 | 0.287 | <0.001 |
| satisfied | 0.423 | 0.556 | 0.704 | |
| dissatisfied | 0.008 | 0.008 | 0.007 | |
| very dissatisfied | 0.002 | 0.004 | 0.002 | |
| *Did not fill a prescription due to costs* | | | | |
| often | 0.007 | 0.017 | 0.006 | 0.23 |
| sometimes | 0.064 | 0.066 | 0.074 | |
| never | 0.928 | 0.917 | 0.92 | |
| *Took a smaller dose due to costs* | | | | |
| often | 0.01 | 0.004 | 0.003 | 0.043 |
| sometimes | 0.023 | 0.047 | 0.03 | |
| never | 0.967 | 0.947 | 0.967 | |
| *Skipped a dose due to costs* | | | | |
| often | 0.004 | 0.002 | 0.008 | 0.0171 |
| sometimes | 0.02 | 0.043 | 0.026 | |
| never | 0.976 | 0.955 | 0.967 | |

*Notes:* Weighted proportions. P-values refer to chi-square tests across racial/ethnic groups; a single p-value applies to each multi-category variable. MCBS 2020 public-use file, summer weights.

### 4.3 Service utilisation: unadjusted results

Levels of service utilization have increased across all variables between 2013 (see Table 11) and 2020 (see Table 12). Non-Hispanic whites remain significantly more likely to have at least one outpatient visit throughout the year than their counterparts from another ethnic category [40.1% against 25.7% and 24.8% in 2013, 48.2% against 41% and 30.3% in 2020, P-val<0.001]. Nevertheless, the proportion of beneficiaries having outpatient visits rose faster for non-Hispanic blacks compared to others [+15.3 percentage points against +8.2 and +5.5 percentage points].

**Table 11:** Healthcare service use by race/ethnicity, 2013

| Service | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| At least one skilled nursing facility stay | 0.013 | 0.011 | 0.007 | 0.4191 |
| At least one inpatient visit | 0.069 | 0.064 | 0.046 | 0.0679 |
| At least one outpatient visit | 0.401 | 0.257 | 0.248 | <0.001 |

*Notes:* Weighted proportions. MCBS 2013 access-to-care file.

**Table 12:** Healthcare service use by race/ethnicity, 2020

| Service | Non-Hispanic White | Non-Hispanic Black | Hispanic | p-value |
|---|---|---|---|---|
| At least one skilled nursing facility stay | 0.029 | 0.021 | 0.021 | 0.2622 |
| At least one inpatient visit | 0.11 | 0.102 | 0.073 | 0.0049 |
| At least one outpatient visit | 0.482 | 0.41 | 0.303 | <0.001 |

*Notes:* Weighted proportions. MCBS 2020 public-use file, fall weights.

### 4.4 Medication access: adjusted results

**Table 13:** Satisfaction with the amount paid for prescription drugs

| | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| Variable | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 1.01 | 0.91–1.12 | 0.892 | 0.85 | 0.75–0.96 | 0.010 |
| Gender | 0.94 | 0.85–1.04 | 0.196 | 1.01 | 0.89–1.15 | 0.850 |
| Hispanic | 1.02 | 0.85–1.23 | 0.820 | 0.53 | 0.42–0.68 | 0.000 |
| Non Hispanic Black | 0.67 | 0.53–0.84 | 0.001 | 0.61 | 0.48–0.78 | 0.000 |
| Income | 0.90 | 0.80–1.01 | 0.064 | 0.93 | 0.79–1.10 | 0.400 |
| High school | 0.83 | 0.72–0.95 | 0.008 | 1.02 | 0.89–1.18 | 0.753 |
| Less than highschool | 0.66 | 0.56–0.78 | 0.000 | 0.73 | 0.56–0.95 | 0.022 |
| HBP | 1.11 | 0.98–1.26 | 0.099 | 0.94 | 0.82–1.08 | 0.353 |
| High cholesterol | 1.14 | 1.02–1.27 | 0.021 | 1.20 | 1.03–1.41 | 0.020 |
| Diabetes | 0.91 | 0.81–1.02 | 0.088 | 1.01 | 0.85–1.20 | 0.893 |
| Heart disease | 1.30 | 1.11–1.52 | 0.001 | 0.93 | 0.75–1.15 | 0.514 |
| COPD | 0.92 | 0.81–1.04 | 0.179 | 0.84 | 0.71–1.00 | 0.047 |
| Heart failure | 1.01 | 0.82–1.24 | 0.936 | 0.95 | 0.68–1.34 | 0.786 |
| Depression | 0.96 | 0.84–1.09 | 0.506 | 0.90 | 0.78–1.05 | 0.177 |
| Cancer | 1.10 | 0.97–1.25 | 0.126 | 1.08 | 0.95–1.22 | 0.262 |
| Very good | 0.64 | 0.54–0.75 | 0.000 | 0.69 | 0.57–0.83 | 0.000 |
| Good | 0.44 | 0.38–0.52 | 0.000 | 0.50 | 0.42–0.60 | 0.000 |
| Fair | 0.36 | 0.30–0.44 | 0.000 | 0.48 | 0.38–0.61 | 0.000 |
| Poor | 0.42 | 0.32–0.56 | 0.000 | 0.59 | 0.36–0.98 | 0.042 |
| Private | 0.70 | 0.59–0.83 | 0.000 | 0.69 | 0.54–0.87 | 0.002 |

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*Table 13 (continued)*

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Medicare Advantage | 0.78 | 0.68–0.90 | 0.001 | 0.88 | 0.72–1.07 | 0.185 |
| Part D | 0.51 | 0.43–0.59 | 0.000 | 0.42 | 0.33–0.52 | 0.000 |
| Medicaid | 1.72 | 1.40–2.12 | 0.000 | 1.63 | 1.21–2.19 | 0.001 |
| constant | 0.96 | 0.79–1.16 | 0.648 | 1.68 | 1.29–2.18 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 14:** Satisfaction with the covered drug list

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 0.96 | 0.84–1.10 | 0.551 | 0.91 | 0.80–1.02 | 0.116 |
| Gender | 1.03 | 0.91–1.16 | 0.664 | 1.05 | 0.93–1.18 | 0.426 |
| Hispanic | 1.38 | 1.13–1.67 | 0.002 | 0.50 | 0.38–0.66 | 0.000 |
| Non Hispanic Black | 0.62 | 0.50–0.78 | 0.000 | 0.81 | 0.66–1.01 | 0.056 |
| Income | 0.84 | 0.71–1.00 | 0.052 | 0.83 | 0.70–0.99 | 0.037 |
| High school | 0.86 | 0.73–1.02 | 0.078 | 0.90 | 0.78–1.04 | 0.152 |
| Less than highschool | 0.64 | 0.53–0.78 | 0.000 | 0.65 | 0.50–0.85 | 0.002 |
| HBP | 1.13 | 0.96–1.31 | 0.131 | 1.04 | 0.88–1.24 | 0.650 |
| High cholesterol | 1.07 | 0.95–1.20 | 0.274 | 1.17 | 1.00–1.37 | 0.049 |
| Diabetes | 0.94 | 0.80–1.10 | 0.446 | 0.99 | 0.84–1.17 | 0.921 |
| Heart disease | 1.37 | 1.14–1.66 | 0.001 | 1.05 | 0.85–1.31 | 0.633 |
| COPD | 1.01 | 0.84–1.21 | 0.941 | 0.93 | 0.79–1.10 | 0.395 |
| Heart failure | 1.19 | 0.97–1.46 | 0.098 | 1.00 | 0.76–1.32 | 0.982 |
| Depression | 0.77 | 0.65–0.91 | 0.003 | 0.91 | 0.78–1.07 | 0.245 |
| Cancer | 1.25 | 1.07–1.46 | 0.006 | 1.18 | 1.03–1.36 | 0.019 |
| Very good | 0.68 | 0.57–0.80 | 0.000 | 0.69 | 0.58–0.81 | 0.000 |
| Good | 0.49 | 0.40–0.59 | 0.000 | 0.48 | 0.41–0.57 | 0.000 |
| Fair | 0.39 | 0.31–0.49 | 0.000 | 0.47 | 0.38–0.59 | 0.000 |
| Poor | 0.47 | 0.35–0.65 | 0.000 | 0.43 | 0.26–0.69 | 0.001 |
| Private | 1.39 | 1.11–1.74 | 0.005 | 1.11 | 0.91–1.35 | 0.292 |
| Medicare Advantage | 1.22 | 1.00–1.48 | 0.050 | 1.24 | 1.09–1.42 | 0.002 |
| Medicaid | 2.05 | 1.63–2.58 | 0.000 | 1.62 | 1.25–2.10 | 0.000 |
| constant | 0.53 | 0.39–0.70 | 0.000 | 0.75 | 0.61–0.93 | 0.009 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 15:** Satisfaction with finding a pharmacy

| | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| Variable | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 0.91 | 0.81–1.02 | 0.109 | 0.95 | 0.84–1.07 | 0.402 |
| Gender | 1.18 | 1.06–1.32 | 0.004 | 1.15 | 1.01–1.32 | 0.039 |
| Hispanic | 0.98 | 0.81–1.17 | 0.811 | 0.38 | 0.30–0.49 | 0.000 |
| Non Hispanic Black | 0.54 | 0.43–0.67 | 0.000 | 0.71 | 0.58–0.87 | 0.001 |
| Income | 0.78 | 0.68–0.91 | 0.001 | 0.67 | 0.57–0.79 | 0.000 |
| High school | 0.78 | 0.69–0.89 | 0.000 | 0.77 | 0.67–0.90 | 0.001 |
| Less than highschool | 0.52 | 0.44–0.63 | 0.000 | 0.52 | 0.40–0.69 | 0.000 |
| HBP | 1.09 | 0.95–1.24 | 0.205 | 1.16 | 0.99–1.36 | 0.067 |
| High cholesterol | 1.08 | 0.97–1.22 | 0.171 | 1.09 | 0.94–1.26 | 0.235 |
| Diabetes | 0.99 | 0.88–1.12 | 0.907 | 1.08 | 0.92–1.27 | 0.356 |
| Heart disease | 1.08 | 0.91–1.28 | 0.371 | 1.00 | 0.80–1.25 | 0.988 |
| COPD | 1.13 | 0.97–1.32 | 0.128 | 1.01 | 0.85–1.21 | 0.892 |
| Heart failure | 1.26 | 1.00–1.58 | 0.049 | 1.01 | 0.76–1.36 | 0.919 |
| Depression | 0.97 | 0.84–1.12 | 0.689 | 1.01 | 0.88–1.16 | 0.876 |
| Cancer | 1.12 | 0.97–1.29 | 0.112 | 1.07 | 0.93–1.24 | 0.362 |
| Very good | 0.70 | 0.59–0.83 | 0.000 | 0.74 | 0.62–0.88 | 0.001 |
| Good | 0.47 | 0.39–0.56 | 0.000 | 0.53 | 0.44–0.63 | 0.000 |
| Fair | 0.41 | 0.34–0.50 | 0.000 | 0.54 | 0.43–0.68 | 0.000 |
| Poor | 0.42 | 0.31–0.56 | 0.000 | 0.40 | 0.25–0.62 | 0.000 |
| Private | 1.29 | 1.06–1.57 | 0.012 | 1.08 | 0.90–1.29 | 0.408 |
| Medicare Advantage | 1.24 | 1.03–1.50 | 0.026 | 1.16 | 1.01–1.32 | 0.030 |
| Medicaid | 1.57 | 1.27–1.94 | 0.000 | 1.54 | 1.15–2.06 | 0.004 |
| constant | 1.36 | 1.04–1.78 | 0.023 | 1.60 | 1.27–2.03 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 16:** Not filling a prescription because of cost

| | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| Variable | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 0.44 | 0.36–0.52 | 0.000 | 0.61 | 0.49–0.76 | 0.000 |
| Gender | 1.25 | 1.02–1.53 | 0.032 | 1.39 | 1.12–1.73 | 0.004 |
| Hispanic | 0.90 | 0.65–1.24 | 0.524 | 1.05 | 0.65–1.69 | 0.850 |
| Non Hispanic Black | 1.04 | 0.73–1.47 | 0.839 | 1.09 | 0.68–1.75 | 0.704 |
| Income | 1.72 | 1.42–2.08 | 0.000 | 1.53 | 1.14–2.05 | 0.005 |
| High school | 1.13 | 0.93–1.37 | 0.217 | 1.02 | 0.79–1.30 | 0.897 |
| Less than highschool | 1.14 | 0.84–1.55 | 0.389 | 1.18 | 0.78–1.80 | 0.426 |
| HBP | 0.94 | 0.73–1.21 | 0.630 | 1.10 | 0.84–1.44 | 0.473 |
| High cholesterol | 1.24 | 1.02–1.51 | 0.032 | 1.13 | 0.86–1.47 | 0.375 |
| Diabetes | 1.19 | 0.95–1.49 | 0.136 | 1.35 | 1.07–1.71 | 0.013 |

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*Table 16 (continued)*

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Heart disease | 0.99 | 0.73–1.33 | 0.924 | 1.15 | 0.78–1.70 | 0.472 |
| COPD | 1.34 | 1.06–1.70 | 0.016 | 1.74 | 1.33–2.28 | 0.000 |
| Heart failure | 1.08 | 0.79–1.48 | 0.626 | 1.75 | 1.15–2.66 | 0.009 |
| Depression | 1.63 | 1.31–2.03 | 0.000 | 1.54 | 1.16–2.04 | 0.004 |
| Cancer | 0.97 | 0.77–1.21 | 0.760 | 1.42 | 1.09–1.85 | 0.011 |
| Very good | 1.09 | 0.75–1.58 | 0.654 | 1.53 | 1.00–2.32 | 0.049 |
| Good | 1.62 | 1.18–2.22 | 0.003 | 2.26 | 1.40–3.63 | 0.001 |
| Fair | 2.45 | 1.76–3.41 | 0.000 | 2.62 | 1.66–4.12 | 0.000 |
| Poor | 2.54 | 1.69–3.84 | 0.000 | 2.63 | 1.30–5.34 | 0.008 |
| Private | 0.59 | 0.43–0.81 | 0.001 | 0.78 | 0.48–1.26 | 0.300 |
| Medicare Advantage | 0.88 | 0.66–1.19 | 0.414 | 1.10 | 0.74–1.64 | 0.631 |
| Part D | 0.99 | 0.73–1.36 | 0.967 | 1.69 | 1.09–2.61 | 0.019 |
| Medicaid | 0.45 | 0.31–0.64 | 0.000 | 0.42 | 0.26–0.66 | 0.000 |
| constant | 0.04 | 0.03–0.06 | 0.000 | 0.02 | 0.01–0.03 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 17:** Other medication cost-coping behaviours

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 0.63 | 0.52–0.77 | 0.000 | 0.64 | 0.49–0.84 | 0.002 |
| Gender | 1.01 | 0.84–1.21 | 0.947 | 1.16 | 0.82–1.66 | 0.396 |
| Hispanic | 0.80 | 0.52–1.23 | 0.305 | 0.87 | 0.51–1.49 | 0.607 |
| Non Hispanic Black | 1.07 | 0.75–1.54 | 0.700 | 1.42 | 0.83–2.43 | 0.203 |
| Income | 1.65 | 1.26–2.17 | 0.000 | 2.08 | 1.39–3.12 | 0.000 |
| High school | 0.86 | 0.70–1.06 | 0.164 | 0.84 | 0.63–1.12 | 0.242 |
| Less than highschool | 0.81 | 0.58–1.13 | 0.219 | 0.89 | 0.47–1.68 | 0.720 |
| HBP | 0.62 | 0.48–0.80 | 0.000 | 0.84 | 0.58–1.23 | 0.374 |
| High cholesterol | 1.17 | 0.92–1.51 | 0.202 | 1.13 | 0.83–1.55 | 0.441 |
| Diabetes | 1.26 | 0.98–1.61 | 0.071 | 1.61 | 1.17–2.22 | 0.004 |
| Heart disease | 1.06 | 0.77–1.46 | 0.710 | 2.32 | 1.48–3.62 | 0.000 |
| COPD | 1.76 | 1.35–2.30 | 0.000 | 1.35 | 0.92–1.97 | 0.122 |
| Heart failure | 0.96 | 0.71–1.30 | 0.793 | 1.31 | 0.75–2.28 | 0.342 |
| Depression | 2.11 | 1.63–2.72 | 0.000 | 1.48 | 1.07–2.05 | 0.020 |
| Cancer | 0.91 | 0.74–1.14 | 0.416 | 1.41 | 0.99–2.00 | 0.057 |
| Very good | 1.21 | 0.83–1.76 | 0.307 | 1.26 | 0.73–2.16 | 0.409 |
| Good | 1.65 | 1.19–2.30 | 0.003 | 1.66 | 0.98–2.81 | 0.061 |
| Fair | 3.07 | 2.08–4.55 | 0.000 | 1.69 | 0.87–3.27 | 0.120 |
| Poor | 2.66 | 1.70–4.18 | 0.000 | 1.68 | 0.72–3.91 | 0.227 |

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*Table 17* (*continued*)

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Private | 0.85 | 0.62–1.17 | 0.322 | 0.81 | 0.47–1.40 | 0.450 |
| Medicare Advantage | 1.02 | 0.75–1.39 | 0.883 | 1.08 | 0.69–1.71 | 0.730 |
| Part D | 1.39 | 1.04–1.86 | 0.026 | 1.04 | 0.58–1.85 | 0.906 |
| Medicaid | 0.56 | 0.38–0.84 | 0.005 | 0.53 | 0.32–0.87 | 0.013 |
| constant | 0.03 | 0.02–0.05 | 0.000 | 0.02 | 0.01–0.04 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

### *4.4.1 Socioeconomic characteristics*

After adjustment, several notable evolutions can be observed regarding differences in medication access between ethnic groups. Hispanics have experienced the sharpest decline in satisfaction relative to other ethnic groups, as being Hispanic has a significant negative impact on the chance of one being satisfied for all three satisfaction variables in 2020, which was not the case in 2013. When it comes to satisfaction with the amount paid for prescription drugs, Hispanics are now significantly less likely to be satisfied than non-Hispanic whites [OR = 0.53, 95%(0.42,0.68)], contrary to conclusions drawn for 2013 [OR = 1.02, 95%CI(0.85,1.23)]. Besides, while Hispanics were significantly more likely to be satisfied with the drug list comprised in their drug plan in 2013 [OR = 1.38, 95%CI(1.13,1.67)], the opposite can be observed with the year 2020 [OR = 0.50, 95%CI(0.38,0.66)]. They are also less likely to be satisfied with finding a pharmacy accepting their drug plan in 2020 [OR = 0.38, 95%CI(0.30,0.49)], even though this was not the case in 2013 [OR = 0.98, 95%CI(0.81,1.17)]. Regarding cost-coping behaviors, however, there remains no significant difference between Hispanics and Non-Hispanic whites. Non-Hispanic blacks, however, have seen an improvement in their satisfaction level compared to that of non-Hispanic whites. Indeed, though being black is still associated with lower levels of satisfaction for the variable linked to amount satisfaction [OR = 0.61, 95%CI(0.48,0.78)] and pharmacy satisfaction [OR = 0.71, 95%CI(0.58,0.87)] in comparison to being white, this difference is no longer significant when it comes to satisfaction with their list of drugs [OR = 0.81, 95%CI(0.66,1.01)]. Besides, similarly to Hispanics, there are still no significant differences between them and non-Hispanic whites as regards cost-coping behaviors.

The impact of other socio-economic variables, such as age, gender, and education level, has remained constant overall when comparing 2013 to 2020, apart from a few notable changes. Beneficiaries aged 75 and above are now significantly less likely to be satisfied with the amount they pay for prescription drugs [OR = 0.85, 95%CI(0.75,0.96)] compared to 2013[OR = 1.01, 95%CI(1.12)]. Besides that, the contradictory relation between age, satisfaction with pharmacy, and likeliness to engage in cost-coping behaviors that were pointed out in a previous study on the subject has maintained itself and is still visible with 2020 data. Similarly, no substantial evolution is observed regarding gender differences. Women are more likely to be satisfied with finding a pharmacy accepting their drug plan [OR = 1.15, 95%CI(1.01,1.32)] and more likely to neglect to fill a prescription in order to cut on costs [OR = 1.39, 95%CI(1.12,1.73)]. People with income inferior to $25,000 annually were also more likely to engage in cost-coping behaviors and more likely to be dissatisfied with their drug plans (except in terms of the amount paid). Lastly, it is interesting to note that education remains a variable that contributes significantly

to access to medication variables, with people having a post-secondary education faring significantly better than their less educated peers across nearly all dependent variables. One minor change can be mentioned regarding levels of satisfaction for the amount paid for prescription drugs where being a high school graduate no longer puts one at a significant disadvantage.

#### *4.4.2 Health characteristics*

As was observed in 2013, health status remains the most significant contributing variable across all dependent variables for medication access. Medicare beneficiaries who assess their health to be below excellent are significantly less likely to be dissatisfied with their drug plan in terms of cost, access to pharmacy, or drug list comprehensiveness. For cost satisfaction for instance, this association is observable even for those who still rate their health status as very good [OR = 0.69, 95%CI(0.57, 0.83)] and is stronger for those in fair condition [OR = 0.48, 95%CI(0.38,0.61)]. Conversely, they are more likely to avoid filling prescriptions to save on costs. Nonetheless, while individuals with a subpar health condition were also significantly more likely to engage in other forms of cost-coping behaviors in 2013, especially those rating their condition as fair [OR = 3.07, 95%CI(2.08,4.55)], this was not the case in 2020 [OR = 1.69, 95%CI(0.87,3.27)]. This suggests that health status is no longer associated as strongly with this type of behavior as it was in 2013.

A similar observation can be made regarding those who suffer from COPD: while beneficiaries with this condition were previously more likely to try and find ways to cut costs [OR = 1.76, 95%CI(1.35,2.30)], this difference is no longer significant [OR = 1.35, 95%CI(0.92,1.97)], save for the odd of not filling a prescription. The same can be observed for those with high blood pressure. Other chronic conditions, however, now have a significant impact on a beneficiary's likelihood to put their health at risks for financial motives. This is notably the case with diabetes [OR = 1.61, 95%CI(1.17,2.22)] and heart diseases [OR = 2.32, 95%CI(1.48, 3.62)]. Therefore, these appear to have partly replaced health status as predictor of cost-coping behaviors. Though, in the case of heart disease, the likelihood of a beneficiary having this condition being discontent with his drug plan no longer differs significantly from that of others.

#### *4.4.3 Prescription-drug coverage*

The type of coverage that has seen the most significant changes is private coverage. Contrary to 2013, beneficiaries who get their drug coverage from one or several private health insurance plans are no longer significantly less likely to be dissatisfied with the amount paid for their drug plan [OR = 0.72, 95%CI(0.72,1.07)], the drug list covered by said plan [OR = 1.11, 95%CI(0.91,1.35)] or with finding a pharmacy that accepts it [OR = 1.08, 95%CI(0.90,1.29)]. Similarly, receiving prescription drug coverage through a Medicare Advantage plan no longer impacts noticeably a beneficiaries likelihood to be less satisfied with their drug plan [OR = 0.88, 95%CI(0.72,1.07)]. On the contrary, being a Medicaid dual enrollee still contributes highly positively to a beneficiary's odds of being satisfied across all variables. It also keeps contributing negatively to one's likelihood of engaging in any manner of cost-coping behavior. Lastly, Part D enrollees show an interesting evolution as they are no longer significantly more likely to take a smaller dose or skip one to save on costs but are now, paradoxically, significantly more likely to refuse to fill a prescription for this same reason.

### 4.5 Service utilisation: adjusted results

**Table 18:** Inpatient service use

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 1.54 | 1.31–1.80 | 0.000 | 1.77 | 1.47–2.13 | 0.000 |
| Gender | 1.02 | 0.88–1.19 | 0.784 | 1.00 | 0.81–1.25 | 0.965 |
| Hispanic | 0.61 | 0.44–0.84 | 0.003 | 0.72 | 0.47–1.10 | 0.124 |
| Non Hispanic Black | 0.74 | 0.56–0.97 | 0.032 | 1.02 | 0.72–1.46 | 0.905 |
| Income | 1.04 | 0.88–1.23 | 0.665 | 1.14 | 0.84–1.54 | 0.398 |
| High school | 1.00 | 0.84–1.19 | 0.964 | 1.23 | 0.98–1.53 | 0.074 |
| Less than highschool | 1.10 | 0.87–1.37 | 0.429 | 1.11 | 0.83–1.49 | 0.466 |
| HBP | 1.09 | 0.92–1.28 | 0.314 | 1.20 | 0.97–1.49 | 0.088 |
| High cholesterol | 0.91 | 0.78–1.06 | 0.233 | 0.81 | 0.66–1.00 | 0.052 |
| Diabetes | 1.14 | 0.97–1.33 | 0.114 | 1.16 | 0.97–1.40 | 0.110 |
| Heart disease | 1.15 | 0.92–1.43 | 0.230 | 1.22 | 0.88–1.67 | 0.225 |
| COPD | 1.28 | 1.09–1.51 | 0.004 | 1.20 | 0.95–1.53 | 0.125 |
| Heart failure | 2.39 | 1.86–3.07 | 0.000 | 1.84 | 1.32–2.55 | 0.000 |
| Depression | 1.27 | 1.08–1.48 | 0.003 | 1.15 | 0.93–1.43 | 0.193 |
| Cancer | 1.23 | 1.05–1.43 | 0.010 | 1.24 | 1.00–1.54 | 0.046 |
| Very good | 1.66 | 1.22–2.26 | 0.002 | 2.12 | 1.53–2.94 | 0.000 |
| Good | 3.06 | 2.32–4.03 | 0.000 | 3.23 | 2.23–4.68 | 0.000 |
| Fair | 4.22 | 3.11–5.72 | 0.000 | 4.93 | 3.41–7.13 | 0.000 |
| Poor | 5.65 | 3.81–8.36 | 0.000 | 7.98 | 4.51–14.10 | 0.000 |
| Private | 1.04 | 0.86–1.26 | 0.686 | 1.34 | 1.05–1.70 | 0.017 |
| Medicare Advantage | 0.09 | 0.06–0.13 | 0.000 | 0.02 | 0.01–0.04 | 0.000 |
| Medicaid | 1.38 | 1.05–1.81 | 0.020 | 1.54 | 1.00–2.36 | 0.051 |
| constant | 0.04 | 0.03–0.06 | 0.000 | 0.02 | 0.01–0.03 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 19:** Outpatient service use

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 1.43 | 1.27–1.60 | 0.000 | 1.51 | 1.33–1.72 | 0.000 |
| Gender | 1.54 | 1.37–1.74 | 0.000 | 1.53 | 1.37–1.72 | 0.000 |
| Hispanic | 0.58 | 0.46–0.74 | 0.000 | 0.63 | 0.47–0.85 | 0.002 |
| Non Hispanic Black | 0.70 | 0.56–0.87 | 0.002 | 0.62 | 0.46–0.83 | 0.001 |
| Income | 0.99 | 0.84–1.15 | 0.851 | 0.99 | 0.84–1.16 | 0.871 |
| High school | 1.04 | 0.91–1.19 | 0.581 | 1.14 | 1.00–1.31 | 0.053 |
| Less than highschool | 1.07 | 0.89–1.29 | 0.480 | 1.38 | 1.05–1.81 | 0.020 |
| HBP | 1.14 | 1.00–1.31 | 0.053 | 1.13 | 0.99–1.29 | 0.069 |
| High cholesterol | 1.19 | 1.05–1.34 | 0.008 | 1.26 | 1.11–1.44 | 0.001 |
| Diabetes | 0.97 | 0.86–1.10 | 0.651 | 0.99 | 0.83–1.17 | 0.888 |

*Continued on next page*

*Table 19 (continued)*

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Heart disease | 1.18 | 0.99–1.41 | 0.070 | 1.63 | 1.28–2.08 | 0.000 |
| COPD | 1.35 | 1.15–1.58 | 0.000 | 1.15 | 0.98–1.35 | 0.095 |
| Heart failure | 1.53 | 1.21–1.94 | 0.000 | 1.86 | 1.45–2.39 | 0.000 |
| Depression | 1.12 | 0.96–1.31 | 0.137 | 1.01 | 0.85–1.19 | 0.948 |
| Cancer | 1.50 | 1.26–1.78 | 0.000 | 1.34 | 1.15–1.56 | 0.000 |
| Very good | 1.39 | 1.18–1.63 | 0.000 | 1.28 | 1.06–1.56 | 0.011 |
| Good | 1.74 | 1.44–2.10 | 0.000 | 1.75 | 1.44–2.11 | 0.000 |
| Fair | 2.11 | 1.72–2.60 | 0.000 | 1.75 | 1.31–2.33 | 0.000 |
| Poor | 2.53 | 1.82–3.51 | 0.000 | 1.84 | 1.23–2.76 | 0.003 |
| Private | 1.53 | 1.31–1.77 | 0.000 | 1.63 | 1.38–1.93 | 0.000 |
| Medicare Advantage | 0.03 | 0.02–0.04 | 0.000 | 0.02 | 0.01–0.03 | 0.000 |
| Medicaid | 2.07 | 1.61–2.65 | 0.000 | 1.99 | 1.41–2.81 | 0.000 |
| constant | 0.45 | 0.38–0.54 | 0.000 | 0.36 | 0.28–0.47 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

**Table 20:** Skilled nursing facility use

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Age | 2.60 | 1.83–3.70 | 0.000 | 4.14 | 2.31–7.40 | 0.000 |
| Gender | 1.61 | 1.23–2.13 | 0.001 | 1.09 | 0.73–1.63 | 0.665 |
| Hispanic | 0.55 | 0.30–1.04 | 0.064 | 0.32 | 0.12–0.91 | 0.032 |
| Non Hispanic Black | 0.51 | 0.30–0.84 | 0.010 | 0.69 | 0.26–1.84 | 0.451 |
| Income | 0.98 | 0.72–1.34 | 0.909 | 1.94 | 1.21–3.11 | 0.006 |
| High school | 0.69 | 0.51–0.95 | 0.021 | 0.77 | 0.48–1.23 | 0.276 |
| Less than highschool | 0.87 | 0.62–1.22 | 0.425 | 0.56 | 0.23–1.35 | 0.196 |
| HBP | 1.32 | 0.92–1.89 | 0.135 | 1.43 | 0.90–2.29 | 0.132 |
| High cholesterol | 0.83 | 0.65–1.06 | 0.137 | 0.68 | 0.43–1.09 | 0.106 |
| Diabetes | 1.09 | 0.79–1.50 | 0.614 | 1.20 | 0.75–1.91 | 0.448 |
| Heart disease | 1.00 | 0.70–1.44 | 0.994 | 0.84 | 0.46–1.55 | 0.576 |
| COPD | 1.38 | 1.06–1.78 | 0.016 | 0.77 | 0.44–1.35 | 0.358 |
| Heart failure | 2.40 | 1.58–3.65 | 0.000 | 0.88 | 0.40–1.92 | 0.741 |
| Depression | 1.32 | 1.02–1.69 | 0.033 | 1.27 | 0.76–2.13 | 0.363 |
| Cancer | 1.14 | 0.84–1.56 | 0.387 | 1.02 | 0.62–1.70 | 0.924 |
| Very good | 2.14 | 1.10–4.17 | 0.025 | 7.77 | 1.73–34.86 | 0.008 |
| Good | 4.76 | 2.64–8.59 | 0.000 | 9.81 | 2.25–42.78 | 0.003 |
| Fair | 5.49 | 2.77–10.87 | 0.000 | 25.47 | 6.18–104.88 | 0.000 |
| Poor | 9.81 | 4.54–21.17 | 0.000 | 47.12 | 9.59–231.56 | 0.000 |
| Private | 1.16 | 0.83–1.62 | 0.382 | 1.10 | 0.61–1.98 | 0.748 |

*Continued on next page*

*Table 20 (continued)*

| Variable | 2013 | | | 2020 | | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Medicare Advantage | 0.34 | 0.23–0.52 | 0.000 | 0.05 | 0.01–0.20 | 0.000 |
| Medicaid | 1.55 | 1.01–2.36 | 0.044 | 2.33 | 1.00–5.41 | 0.049 |
| constant | 0.00 | 0.00–0.01 | 0.000 | 0.00 | 0.00–0.00 | 0.000 |

*Notes:* Multivariable logistic regressions. OR: odds ratio; CI: confidence interval. Values printed as 0.000 are rounded p-values.

#### *4.5.1 Socioeconomic characteristics*

While a beneficiary's ethnic background contributed significantly to his or her likelihood to use inpatient services or stay at a skilled nurse facility in 2013, this is no longer the case in 2020. For instance, looking at inpatient service use, Hispanics were significantly less likely than others to spend at least a night at the hospital in 2013 [OR = 0.74, 95%CI(0.56,0.97)] but not in 2020 [OR = 1.02, 95%CI(0.72,1.46)]. This trend, however, did not extend to outpatient service use, with Non-Hispanic Blacks and Hispanics remaining less likely than their white counterparts to receive ambulatory care.

Regarding skilled nursing facility use, gender differences are no longer statistically relevant: Though women were more likely than men to rely on this type of service in 2013 [OR = 1.61, 95%CI(1.23,2.13)] the same cannot be said for 2020 [OR = 1.09, 95%CI(0.73,1.63)].

#### *4.5.2 Health characteristics*

As was observed with variables pertaining to medication access, health-status remains the most significant contributor for service utilization variables. Unsurprisingly, the worse a beneficiary considers his health to be, the higher his or her odds to go to a healthcare facility. This phenomenon is less pronounced for outpatient care but remains important.

Looking at chronic conditions, COPD is not a significant contributing factor anymore, regardless of the service utilization variable involved. Conversely, heart related diseases now have a noticeable positive impact on outpatient service use [OR = 1.63, 95%CI(1.28,2.08)].

#### *4.5.3 Insurance coverage*

No significant differences are observed between the year 2013 and the year 2020 as regards the impact of a given beneficiary's type of health coverage on his odds of using any of the healthcare services considered in this study. Those with a Medicare advantage plan remain significantly less likely to use the aforementioned services, whereas those with Medicaid coverage or with a supplemental private insurance plan (Medigap) are still significantly more likely to do so.

### **4.6 Interactions with race and ethnicity**

**Table 21:** Statistically significant interaction terms

| Outcome | Interaction | Ratio of odds ratios | p-value | Inverse ratio |
|---|---|---|---|---|
| satisfaction with finding pharmacy | HBP x Hispanic | 0.59 | 0.025 | 1.69 |
| satisfaction with finding pharmacy | HBP x Non-Hispanic Black | 2.25 | 0.035 | 0.44 |
| satisfaction with finding pharmacy | Age x Hispanic | 0.58 | 0.034 | 1.72 |
| satisfaction with finding pharmacy | Cancer x Hispanic | 0.61 | 0.05 | 1.64 |
| satisfaction with finding pharmacy | MA x Hispanic | 1.61 | 0.02 | 0.62 |
| cost-coping behaviors | Depression x Hispanic | 5.32 | 0.007 | 0.19 |
| inpatient service use | Diabetes x Non-Hispanic Black | 2.77 | 0.019 | 0.36 |
| inpatient service use | HBP x Non-Hispanic Black | 0.34 | 0.05 | 2.94 |
| outpatient service use | HBP x Hispanic | 0.54 | 0.019 | 1.85 |
| outpatient service use | MAOU x Hispanic | 0.39 | <0.001 | 2.56 |

*Notes:* HBP: high blood pressure; MA: Medicare Advantage; MAOU: Medicare Advantage coding for service utilisation.

### *4.6.1 Medication access*

As can be seen in the Table 21, most significant ethnicity-related interaction effects pertaining to a beneficiary's satisfaction with finding a pharmacy that accepts his drug plan involve a chronic condition. For instance, being Hispanic implies a 41% lower odds ratio for high-blood pressure than the one observed for Non-Hispanic Whites. Therefore, having high blood pressure has a significantly more negative impact on the aforementioned dependent variable for Hispanic beneficiaries compared to non-Hispanic white beneficiaries. The opposite can be said for non-Hispanic Blacks.

Nonetheless, the odds ratio associated with Medicare Advantage is 61% higher for Hispanic beneficiaries compared to their Non-Hispanic White counterparts. This means Hispanic beneficiaries with Medicare Advantage tend to display higher satisfaction levels than those with the same plan but who belong to the latter category.

When looking at cost-coping behaviors, this study shows a significant interaction effect linking Hispanics and Depression. The odds ratio of Depression is indeed 5.32 times higher for Hispanics, pointing to a significant mediating power of ethnicity, for Hispanics, on the effect of depression on the likelihood of engaging in cost-coping behaviors.

### *4.6.2 Service utilisation*

As with access to medication variables, the independent variables that show the most significant interaction effects when considering ethnicity are those related to chronic conditions. Regarding inpatient service use, the odds ratio for diabetes is significantly superior for Non-Hispanic Black beneficiaries compared to Non-Hispanic White beneficiaries. Conversely, the odds ratio for Non-Hispanic Blacks with a high blood pressure condition is significantly lower compared to Non-Hispanic Whites suffering from the same condition.

Lastly, contrary to what was observed with the dependent variable pertaining to pharmacy satisfaction, being Hispanic or not has a strongly negative moderating effect on the impact of receiving health insurance via a Medicare Advantage plan on outpatient service.

## 5 Discussion

This study shows that there were noticeable evolutions in terms of differences in access to medication and service utilization in relation to race between 2013 and 2020. Looking at access to medication (ATM), overall levels of satisfaction have risen for Non-Hispanic Whites and Non-Hispanic blacks, whereas they have dropped significantly for their Hispanic counterparts. This remains true when considering adjusted results, along with the fact that non-Hispanic white beneficiaries tend to fare better than others regardless of the ATM variable involved. The latter is also true for outpatient service utilization, which is still much higher for non-Hispanic whites, even though other ethnic groups are slowly catching up.

Regarding access to medication, these results speak to a well-documented truth that there linger significant ethnicity-related disparities in terms of drug plans, and more specifically in terms of access to information on available quality drug plans [32]. This can explain some of the persisting differences that have been observed after the implementation of Part D plans in 2013, despite these plans having a measurable positive effect on levels of health coverage [33].

For service utilization, the discrepancies shown in this study are most statistically significant for outpatient service use. This is a well-known issue [34] and raises the question of inequality in access to forms of preventive care which may then have an impact on hospital readmission rates. Besides, a recent report from the Kaiser Family Foundation [35] points out the broader concern of differentiated access to care and service utilization based on race due to cost barriers.

On this note, this study highlights the major influence of SES variables on access to medication variables, notably income with beneficiaries earning less than $25,000 being significantly more likely to put their health at risk to save money. Such inequalities were already touched upon in the late 1990s [36] and in 2013 and appear to have maintained themselves in 2020.

Similarly, chronic conditions and self-assessed health status remain the most important contributing factor when evaluating satisfaction with access to medication and service utilization. Nonetheless, the role of the latter has somewhat dwindled when predicting medication cost-related non-adherence, to the benefit of some chronic conditions such as cancer. The type of Medicare coverage is also of importance, notably when looking at Medicaid and Medicare Advantage plans as can be seen in this study and in recent scientific literature [37]. This is all the truer when looking at service utilization variables where the influence of moral hazard and adverse selection can be clearly seen.

In addition, this study shows that ethnicity can have a strong moderating effect on the impact of both variables related to some chronic conditions, such as High blood pressure, as well as variables related to health insurance coverage plans. The fact is that preexisting racial biases in the US can have an impact on the incidence rates of some chronic conditions [38] which can lead to real health complications.

These issues are part of a larger context of major healthcare inequalities in the US, that ought to be addressed through better information, stronger healthcare subsidies program, better-designed higher-quality health plans, and through spreading awareness of racial biases in the medical field. Fixing these inequalities linked to medication access is vital to ease the stress that is then put on the rest of the healthcare system [39].

There are, nonetheless, limitations to this study. While chronic conditions are an important predictor, they also tend to be underdiagnosed for minorities which might have an influence on the conclusion drawn in this study. The question of ethnic misclassification is also one that has emerged [40] in recent literature regarding CMS-produced databases, including the MCBS, and calls for caution in addition to preexisting self-reporting biases when it comes to race. Lastly, this study only looks at two separate and fairly remote years to make its comparisons instead of looking at the year-to-year evolution. This, in addition to the fact that this study focuses on association rather than causation, makes additional studies necessary to fully understand what changes took place between 2014 and 2020 and how.

More detailed research should also be conducted to take into account other minorities, notably Asian Americans, as well as differences within a single ethnic group. This has been identified as a major problem for broad and ill-defined ethnic groups such as Hispanics [41]. Looking at location-based inequalities is also important when considering the discrepancies in experience faced by different ethnic groups [42] and raises the broader question of existing interaction effects between ethnicity factors and other factors, which should also be further investigated.

## Acknowledgements

I would like to extend my deepest gratitude to my thesis advisor Professor Jérôme Creel for the invaluable insights he provided me during this journey. This first dive into the world of research would undoubtedly not have been as pleasant if it weren't for the precious time, he invested in guiding me through the many hardships that paved the way to my finishing this paper. I cannot thank him enough for his commitment to helping me despite my being thousands of kilometers away from France.

I would also like to sincerely thank Professor Kim Baeho, Professor Kanghyock Koh and Professor Seon Lee at Korea University for their very helpful advice on the technical and statistical aspects of this paper. Likewise, I would like to express my thanks to Dr. Deborah Tairah, professor at the University of Hawaï, for her valuable aid with the replication used in this study.

My special thoughts go to my parents for their support during this most eventful adventure. This proved indispensable to keeping my motivation throughout the year. Lastly, I would be remiss in not mentioning my friends, Alban and Yannick for their help both emotionally and technically.

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# A Replication of the 2013 study

## A.1 Replication design

To verify the model used in this study and perform a comparison between the year 2020 and older data, a replication of a former study [5] on a related subject was carried out. The study replicated focused on results from the 2013 MCBS data and analyzed associations in the access to medications for Medicare enrollees. It relied on chi-square tests and multivariable logistic regressions to capture a comprehensive picture of the Medicare beneficiaries' population in terms of access to prescription drugs. The population studied was restricted to individuals for whom data on prescription drugs were available, who were above 65 years old, and whose race was clearly defined in the base survey. Individuals whose race was listed as others were therefore removed from the study. Furthermore, for some dependent variables, individuals with no drug coverage were excluded as well, leading to a population comprised between 10,515 and 8,901 depending on the outcome variable. Lastly, all proportions obtained were adjusted for the sampling weights provided by the MCBS, which account for survey non-response, clustering, and stratification.

### *A.1.1 Chi-square tests and variable definitions*

Since the original paper did not mention the way the variables it used were coded, the first part of the replication consisted in finding this information through experimentation while looking at the proportions and p-values given by the chi-square tests. These experiments, carried out on Stata V17 (compared to Stata V13 for the study replicated), gave the results displayed in Table A1 for the chi-square test.

**Table A1:** Chi-square tests: replication versus the source study

| Variable | Replication p-value | Source p-value | Same proportions? | Significance differs? |
|---|---|---|---|---|
| Gender | 0.07 | 0.07 | Yes | No |
| Age | <0.001 | <0.001 | Yes | No |
| Education | <0.001 | <0.001 | Yes | No |
| Income | <0.001 | <0.001 | Yes | No |
| High blood pressure | <0.001 | <0.001 | Yes | No |
| High cholesterol | 0.1 | 0.4 | Yes | No |
| Diabetes | <0.001 | <0.001 | Yes | No |
| Heart disease | 0.02 | 0.1 | Yes | No |
| COPD | 0.15 | 0.73 | Yes | No |
| Heart failure | 0.28 | 0.01 | Yes | No |
| Depression | <0.001 | <0.001 | Yes | No |
| Cancer | <0.001 | <0.001 | Yes | No |
| Health status | <0.001 | <0.001 | Yes | No |
| Part D | <0.001 | <0.001 | Yes | No |
| Private | <0.001 | <0.001 | Yes | No |
| Medicaid | <0.001 | <0.001 | Yes | No |
| Medicare Advantage | <0.001 | <0.001 | Yes | No |
| No coverage | <0.001 | <0.001 | Yes | No |

*Continued on next page*

*Table A1* (*continued*)

| Variable | Replication p-value | Source p-value | Same proportions? | Significance differs? |
|---|---|---|---|---|
| Satisfaction with amount paid | <0.001 | <0.001 | Yes | No |
| Satisfaction with drug list | <0.001 | <0.001 | Yes | No |
| Satisfaction with finding a pharmacy | <0.001 | <0.001 | Yes | No |
| No fill | 0.1 | <0.001 | Yes | Yes |
| Took a smaller dose | 0.8 | 0.08 | Yes | No |
| Skipped dose | 0.9 | <0.001 | Yes | Yes |

As can be seen in the Table A1, all variables related to health status, insurance coverage, and socio-economic conditions showed the same proportions as the ones described in the study replicated. Besides, while some slight differences may be observed when looking at p-values for these variables, they are still in line with the conclusions made in the source paper. The only variables which exhibit a great difference in terms of p-value are the variables related to "individuals not filling a prescription" ( / no fill variable) and "individuals skipping doses of medication to save money" ( / skipped dose variable). However, as shown in the Table A2 for "no fill variable" and in Table A3 for "skipped dose variable", there is no difference in terms of proportion, and the results obtained appear to be more consistent with these proportions than the one described in the study paper.

**Table A2:** No-fill responses by race/ethnicity

| Response | Non-Hispanic White | Non-Hispanic Black | Hispanic |
|---|---|---|---|
| often | 0.90% | 1.50% | 0.50% |
| sometimes | 5.80% | 6.40% | 7.40% |
| never | 93.40% | 92.10% | 92.00% |

*Notes:* Percentages by race/ethnicity.

**Table A3:** Skipped-dose responses by race/ethnicity

| Response | Non-Hispanic White | Non-Hispanic Black | Hispanic |
|---|---|---|---|
| often | 0.50% | 0.70% | 0.50% |
| sometimes | 2.80% | 3.30% | 2.80% |
| never | 96.70% | 96.00% | 96.70% |

*Notes:* Percentages by race/ethnicity.

As can be seen in the above tables, the proportion of individuals who have often, sometimes, or never neglected to fill a prescription because of costs does not vary significantly across ethnic categories. The same observation can be made for the "Skipped dose" variable. Therefore, p-values above 0.001 are likely to be more sensible, which goes in favor of the results obtained in this study.

Based on the results obtained so far regarding proportions and p-values, it is safe to infer that the variables used in this study are reliable proxies for the ones the source paper relied upon. The labels for these variables, based on the MCBS documentation, are thus listed in the Table A4.

**Table A4:** Variable definitions for the 2013 replication

| Variable | MCBS 2013 definition |
|---|---|
| Age | iv_age |
| Gender | iv_sex |
| Ethnicity | iv_race |
| Income | d_icome |
| Education | d_edu |
| Health status | hlt_genhelth |
| High blood pressure | hlt_ochbp |
| Heart disease | hlt_occhd |
| Heart failure | hlt_occfail |
| Cancer | hlt_occancer |
| Diabetes | hlt_ocbetes |
| Depression | hlt_ocdeprss |
| COPD | hlt_ocemphys |
| High Cholesterol | hlt_occholes |
| Medicare Advantage | ins_mhmorx |
| Private | ins_privrx |
| Medicaid | ins_d_mcaid |
| Part D | ins_part_d |
| no coverage | regroups all individuals who do not belong to previous categories |
| Satisfaction amount | acc_mcamtpay |
| Satisfaction Drug list | acc_mcdrglst |
| Satisfaction finding pharmacy | acc_mcfndpcy |
| No fill | acc_nofillrx |
| Took a smaller dose | acc_skiprx |
| Skipped a dose | acc_mcfndpcy |
| Cost-Coping behavior | union of the previous two variables |

### *A.1.2 Multivariable logistic regressions*

The second part of the study replicated took the form of 5 separate multivariable logistic regressions, to look at the association between medication access and ethnicity while adjusting for other parameters such as age, gender, education, or health status. The results of these regressions are listed in Table A4 of the paper.

While the replication carried out on Stata proved to be faithful to the source paper in many regards (see Table A5), there remain some discrepancies. Discrepancies observed for each of the 5 outcome variables are listed below along with the corresponding result tables.

**Table A5:** Replication: satisfaction with the amount paid

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| age | 1.00 | 0.90–1.11 | 1 | 0.90–1.11 |
| Female | 0.90 | 0.81–1.00 | 0.9 | 0.81–0.99 |
| Hispanic | 0.99 | 0.83–1.19 | 0.99 | 0.82–1.19 |
| Non-Hispanic Black | 0.69 | 0.55–0.86 | 0.69 | 0.55–0.86 |
| income | 0.91 | 0.81–1.03 | 1.07 | 0.96–1.19 |
| High school | 0.83 | 0.72–0.95 | 0.83 | 0.73–0.95 |
| LessThanHigh school | 0.67 | 0.57–0.79 | 0.67 | 0.57–0.79 |
| High blood pressure | 1.12 | 0.99–1.27 | 1.12 | 0.99–1.27 |
| High cholesterol | 1.13 | 1.01–1.26 | 1.13 | 1.00–1.26 |
| Diabetes | 0.90 | 0.81–1.01 | 0.9 | 0.81–1.01 |
| Heart disease | 1.26 | 1.09–1.47 | 1.26 | 1.09–1.47 |
| COPD | 0.93 | 0.82–1.04 | 0.93 | 0.82–1.04 |
| Heart Failure | 1.02 | 0.83–1.25 | 1.02 | 0.83–1.25 |
| Depression | 0.96 | 0.84–1.09 | 0.96 | 0.84–1.09 |
| Cancer | 1.10 | 0.97–1.25 | 1.1 | 0.97–1.25 |
| Very good | 0.63 | 0.53–0.74 | 0.63 | 0.53–0.74 |
| Good | 0.44 | 0.38–0.52 | 0.44 | 0.38–0.52 |
| Fair | 0.36 | 0.30–0.43 | 0.36 | 0.30–0.43 |
| Poor | 0.42 | 0.32–0.55 | 0.42 | 0.32–0.55 |
| private | 0.98 | 0.85–1.14 | 0.98 | 0.85–1.14 |
| MA | 1.05 | 0.93–1.19 | 1.05 | 0.93–1.19 |
| Part D | 0.82 | 0.67–1.00 | 0.82 | 0.67–1.00 |
| medicaid | 2.32 | 1.91–2.82 | 2.32 | 1.91–2.82 |

*Notes:* OR: odds ratio; CI: confidence interval.

Note: Subpopulation size for the replication = 9952 / Subpopulation size in the study = 9951

For the dependent variable ”Satisfaction with amount paid”, no significant discrepancies between Stata and previous results (see Table A5) are observed apart from the income variable. Nonetheless, the proportions observed for this variable tend to be more in line with the results obtained using Stata. Besides, the confidence interval for the income variable comprises 1.00 in both tables, thus this variable does not have a significant effect on the dependent variable.

**Table A6:** Replication: satisfaction with the drug list

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| age | 0.95 | 0.83–1.09 | 0.94 | 0.85–1.04 |
| Female | 1.03 | 0.92–1.17 | 1.01 | 0.91–1.13 |
| Hispanic | 1.30 | 1.07–1.57 | 1.25 | 1.05–1.50 |
| Non-Hispanic Black | 0.62 | 0.50–0.78 | 0.69 | 0.56–0.85 |
| income | 0.84 | 0.71–1.00 | 0.81 | 0.71–0.94 |

*Continued on next page*

*Table A6* (*continued*)

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| High school | 0.86 | 0.72–1.01 | 0.9 | 0.79–1.03 |
| LessThanHigh school | 0.64 | 0.52–0.77 | 0.64 | 0.54–0.76 |
| High blood pressure | 1.13 | 0.97–1.31 | 1.11 | 0.96–1.27 |
| High cholesterol | 1.07 | 0.95–1.20 | 1.09 | 0.98–1.20 |
| Diabetes | 0.94 | 0.80–1.10 | 0.88 | 0.78–0.99 |
| Heart disease | 1.37 | 1.13–1.66 | 1.26 | 1.06–1.48 |
| COPD | 1.01 | 0.84–1.21 | 0.94 | 0.82–1.09 |
| Heart Failure | 1.20 | 0.98–1.48 | 1.19 | 0.98–1.44 |
| Depression | 0.77 | 0.65–0.92 | 0.83 | 0.72–0.96 |
| Cancer | 1.25 | 1.06–1.46 | 1.17 | 1.03–1.33 |
| Very good | 0.68 | 0.57–0.80 | 0.68 | 0.59–0.77 |
| Good | 0.49 | 0.40–0.60 | 0.49 | 0.42–0.58 |
| Fair | 0.39 | 0.31–0.48 | 0.41 | 0.34–0.50 |
| Poor | 0.47 | 0.35–0.65 | 0.47 | 0.35–0.62 |
| private | 1.38 | 1.10–1.73 | 1.18 | 1.02–1.36 |
| MA | 1.21 | 0.99–1.47 | 1.04 | 0.90–1.21 |
| medicaid | 2.00 | 1.61–2.48 | 1.96 | 1.61–2.38 |

*Notes:* OR: odds ratio; CI: confidence interval.

Note: Subpopulation size for the replication = 6461 / Subpopulation size in the study = 8901

Differences in significance are observed for the income and diabetes variables, which are both significant in the source study but not in the replication (see Table A6). This is likely to be due to a major gap in subpopulation size between the original study and the replication. A gap which may stem from the fact that individuals with no prescription drug coverage are excluded from the population for this variable, however, chi-square tests and observed proportions seem to indicate that the no-coverage variable is defined in the same way in both studies. Thus, it is possible that the study replicated omitted to remove some individuals that were otherwise excluded for all outcome variables.

**Table A7:** Replication: satisfaction with finding a pharmacy

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| age | 0.91 | 0.81–1.02 | 0.91 | 0.83–0.99 |
| Female | 1.19 | 1.06–1.33 | 1.19 | 1.09–1.30 |
| Hispanic | 0.95 | 0.79–1.15 | 0.94 | 0.79–1.13 |
| Non-Hispanic Black | 0.54 | 0.44–0.68 | 0.59 | 0.48–0.72 |
| income | 0.80 | 0.69–0.92 | 0.76 | 0.67–0.86 |
| High school | 0.78 | 0.68–0.89 | 0.78 | 0.71–0.87 |
| LessThanHigh school | 0.53 | 0.44–0.63 | 0.5 | 0.43–0.59 |
| High blood pressure | 1.09 | 0.96–1.24 | 1.04 | 0.94–1.16 |
| High cholesterol | 1.08 | 0.97–1.22 | 1.17 | 1.07–1.28 |
| Diabetes | 0.99 | 0.88–1.12 | 0.96 | 0.86–1.06 |

*Continued on next page*

*Table A7* (*continued*)

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| Heart disease | 1.08 | 0.91–1.28 | 1.13 | 0.97–1.31 |
| COPD | 1.13 | 0.97–1.32 | 1.09 | 0.96–1.24 |
| Heart Failure | 1.27 | 1.01–1.59 | 1.24 | 1.00–1.54 |
| Depression | 0.97 | 0.85–1.12 | 1.04 | 0.93–1.17 |
| Cancer | 1.12 | 0.97–1.28 | 1.11 | 0.99–1.25 |
| Very good | 0.70 | 0.60–0.83 | 0.69 | 0.61–0.78 |
| Good | 0.47 | 0.39–0.56 | 0.46 | 0.40–0.53 |
| Fair | 0.41 | 0.34–0.50 | 0.42 | 0.35–0.49 |
| Poor | 0.42 | 0.31–0.56 | 0.41 | 0.31–0.55 |
| private | 1.25 | 1.03–1.52 | 1.02 | 0.89–1.16 |
| MA | 1.21 | 1.00–1.46 | 1 | 0.88–1.15 |
| medicaid | 1.43 | 1.17–1.74 | 1.38 | 1.14–1.67 |

*Notes:* OR: odds ratio; CI: confidence interval.

Note : Subpopulation size for the replication = 6568 / Subpopulation size in the study = 9057

As with the previous outcome variable, significant discrepancies are observed between Stata and previous results (see Table A7) for the Income and diabetes variables. This is most likely for the same reason as the ones mentioned above since these variables do not exhibit any discrepancies in terms of significance for other outcome variables.

**Table A8:** Replication: not filling a prescription

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| age | 0.44 | 0.37–0.52 | 0.44 | 0.37–0.52 |
| Female | 1.25 | 1.01–1.54 | 1.25 | 1.00–1.54 |
| Hispanic | 0.97 | 0.70–1.34 | 0.97 | 0.70–1.34 |
| Non-Hispanic Black | 1.04 | 0.73–1.46 | 1.04 | 0.73–1.46 |
| income | 1.71 | 1.41–2.08 | 1.71 | 1.41–2.08 |
| High school | 1.13 | 0.93–1.38 | 1.13 | 0.93–1.38 |
| LessThanHigh school | 1.15 | 0.85–1.56 | 1.15 | 0.85–1.56 |
| High blood pressure | 0.94 | 0.73–1.20 | 0.94 | 0.73–1.20 |
| High cholesterol | 1.24 | 1.02–1.51 | 1.24 | 1.02–1.51 |
| Diabetes | 1.19 | 0.94–1.49 | 1.19 | 0.94–1.49 |
| Heart disease | 0.99 | 0.73–1.33 | 0.99 | 0.73–1.33 |
| COPD | 1.35 | 1.06–1.71 | 1.35 | 1.06–1.71 |
| Heart Failure | 1.07 | 0.78–1.47 | 1.07 | 0.78–1.47 |
| Depression | 1.64 | 1.32–2.03 | 1.64 | 1.32–2.03 |
| Cancer | 0.97 | 0.77–1.21 | 0.97 | 0.77–1.21 |
| Very good | 1.09 | 0.75–1.58 | 1.09 | 0.75–1.58 |
| Good | 1.61 | 1.18–2.21 | 1.61 | 1.18–2.21 |
| Fair | 2.46 | 1.76–3.43 | 2.46 | 1.76–3.43 |

*Continued on next page*

*Table A8* (*continued*)

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| Poor | 2.54 | 1.68–3.84 | 2.54 | 1.68–3.84 |
| private | 0.59 | 0.46–0.76 | 0.59 | 0.46–0.76 |
| MA | 0.89 | 0.72–1.11 | 0.89 | 0.72–1.11 |
| Part D | 0.99 | 0.69–1.40 | 0.99 | 0.69–1.40 |
| medicaid | 0.46 | 0.34–0.63 | 0.46 | 0.34–0.63 |

*Notes:* OR: odds ratio; CI: confidence interval.

Note : Subpopulation size for the replication = 10508 / Subpopulation size in the study = 10510

**Table A9:** Replication: other cost-coping behaviours

| | Replication | | Source study | |
|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI |
| age | 0.63 | 0.52–0.77 | 0.63 | 0.52–0.77 |
| Female | 1.03 | 0.86–1.24 | 1.03 | 0.86–1.24 |
| Hispanic | 0.83 | 0.54–1.30 | 0.83 | 0.54–1.30 |
| Non-Hispanic Black | 1.04 | 0.73–1.49 | 1.04 | 0.73–1.49 |
| income | 1.60 | 1.22–2.11 | 1.60 | 1.22–2.11 |
| High school | 0.86 | 0.70–1.06 | 0.86 | 0.70–1.06 |
| LessThanHigh school | 0.81 | 0.58–1.13 | 0.81 | 0.58–1.13 |
| High blood pressure | 0.61 | 0.47–0.80 | 0.61 | 0.47–0.80 |
| High cholesterol | 1.18 | 0.92–1.52 | 1.18 | 0.96–1.37 |
| Diabetes | 1.26 | 0.98–1.61 | 1.12 | 0.92–1.52 |
| Heart disease | 1.07 | 0.78–1.47 | 1.07 | 0.78–1.47 |
| COPD | 1.75 | 1.34–2.28 | 1.75 | 1.34–2.28 |
| Heart Failure | 0.96 | 0.71–1.30 | 0.96 | 0.71–1.84 |
| Depression | 2.09 | 1.62–2.70 | 2.09 | 1.62–2.70 |
| Cancer | 0.92 | 0.74–1.14 | 0.92 | 0.74–1.14 |
| Very good | 1.22 | 0.84–1.78 | 1.22 | 0.84–1.78 |
| Good | 1.66 | 1.20–2.31 | 1.66 | 1.20–2.31 |
| Fair | 3.10 | 2.11–4.57 | 3.10 | 2.11–4.57 |
| Poor | 2.67 | 1.70–4.19 | 2.67 | 1.70–4.19 |
| private | 0.72 | 0.56–0.93 | 0.72 | 0.56–0.93 |
| MA | 0.89 | 0.69–1.13 | 0.89 | 0.69–1.13 |
| Part D | 1.16 | 0.73–1.84 | 1.16 | 0.73–1.84 |
| medicaid | 0.52 | 0.35–0.76 | 0.52 | 0.35–0.76 |

*Notes:* OR: odds ratio; CI: confidence interval.

Note : Subpopulation size for the replication = 10515 / Subpopulation size in the study = 10512

As can be seen in Table A9 for Stata and for previous study results, no significant differences are observed for the last two outcome variables. This supports the idea that the definitions

provided for the income and diabetes variables are in line with the ones used in the replicated study.

### *A.1.3 Alternative coding for the cross-year comparison*

Due to differences in reporting method in the MCBS between 2013 and 2020, this study uses a revised encoding method for variables related to the type of prescription drug coverage. From Table A10 to Table A14, the differences observed between this new model and the one used to replicate the 2013 study are listed.

**Table A10:** Alternative coding: satisfaction with the amount paid

| | Replication | | Revised coding | | |
|---|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI | Difference in significance? |
| Age | 1 | 0.9–1.11 | 0.85 | 0.91–1.12 | No |
| Gender | 0.9 | 0.81–1 | 1.01 | 0.85–1.04 | No |
| Hispanic | 0.99 | 0.83–1.19 | 0.53 | 0.85–1.23 | No |
| Non Hispanic Black | 0.69 | 0.55–0.86 | 0.61 | 0.53–0.84 | No |
| Income | 0.91 | 0.81–1.03 | 0.93 | 0.80–1.01 | No |
| High school | 0.83 | 0.72–0.95 | 1.02 | 0.72–0.95 | No |
| Less than highschool | 0.67 | 0.57–0.79 | 0.73 | 0.56–0.78 | No |
| HBP | 1.11 | 0.99–1.27 | 0.94 | 0.98–1.26 | No |
| High cholesterol | 1.13 | 1.01–1.26 | 1.20 | 1.02–1.27 | No |
| Diabetes | 0.9 | 0.81–1.01 | 1.01 | 0.81–1.02 | No |
| Heart disease | 1.26 | 1.09–1.47 | 0.93 | 1.11–1.52 | No |
| COPD | 0.93 | 0.82–1.04 | 0.84 | 0.81–1.04 | No |
| Heart failure | 1.02 | 0.83–1.25 | 0.95 | 0.82–1.24 | No |
| Depression | 0.96 | 0.84–1.09 | 0.90 | 0.84–1.09 | No |
| Cancer | 1.1 | 0.97–1.25 | 1.08 | 0.97–1.25 | No |
| Very good | 0.63 | 0.53–0.74 | 0.69 | 0.54–0.75 | No |
| Good | 0.44 | 0.38–0.51 | 0.50 | 0.38–0.52 | No |
| Fair | 0.36 | 0.3–0.43 | 0.48 | 0.30–0.44 | No |
| Poor | 0.42 | 0.32–0.44 | 0.59 | 0.32–0.56 | No |
| Private | 0.98 | 0.85–1.14 | 0.69 | 0.59–0.83 | Yes |
| Medicare Advantage | 1.05 | 0.93–1.19 | 0.88 | 0.68–0.90 | Yes |
| Part D | 0.82 | 0.67–1 | 0.42 | 0.43–0.59 | Yes |
| Medicaid | 2.32 | 1.91–2.82 | 1.63 | 1.40–2.12 | No |

*Notes:* Replication versus revised variable coding for the 2013 comparison.

**Table A11:** Alternative coding: satisfaction with the drug list

| | Replication | | Revised coding | | |
|---|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI | Difference in significance? |
| Age | 0.95 | 0.83–1.09 | 0.91 | 0.84–1.10 | No |
| Gender | 1.03 | 0.92–1.17 | 1.05 | 0.91–1.16 | No |
| Hispanic | 1.3 | 1.07–1.57 | 0.50 | 1.13–1.67 | No |
| Non Hispanic Black | 0.62 | 0.5–0.78 | 0.81 | 0.50–0.78 | No |
| Income | 0.84 | 0.71–1 | 0.83 | 0.71–1.00 | No |
| High school | 0.86 | 0.72–1.01 | 0.90 | 0.73–1.02 | No |
| Less than highschool | 0.64 | 0.52–0.77 | 0.65 | 0.53–0.78 | No |
| HBP | 1.13 | 0.97–1.31 | 1.04 | 0.96–1.31 | No |
| High cholesterol | 1.07 | 0.95–1.2 | 1.17 | 0.95–1.20 | No |
| Diabetes | 0.94 | 0.8–1.1 | 0.99 | 0.80–1.10 | No |
| Heart disease | 1.37 | 1.13–1.66 | 1.05 | 1.14–1.66 | No |
| COPD | 1.01 | 0.84–1.21 | 0.93 | 0.84–1.21 | No |
| Heart failure | 1.2 | 0.98–1.48 | 1.00 | 0.97–1.46 | No |
| Depression | 0.77 | 0.65–0.92 | 0.91 | 0.65–0.91 | No |
| Cancer | 1.25 | 1.06–1.46 | 1.18 | 1.07–1.46 | No |
| Very good | 0.68 | 0.57–0.8 | 0.69 | 0.57–0.80 | No |
| Good | 0.49 | 0.4–0.6 | 0.48 | 0.40–0.59 | No |
| Fair | 0.39 | 0.31–0.48 | 0.47 | 0.31–0.49 | No |
| Poor | 0.47 | 0.35–0.65 | 0.43 | 0.35–0.65 | No |
| Private | 1.38 | 1.1–1.73 | 1.11 | 1.11–1.74 | No |
| Medicare Advantage | 1.21 | 0.99–1.47 | 1.24 | 1.00–1.48 | Yes |
| Medicaid | 2 | 1.61–2.48 | 1.62 | 1.63–2.58 | No |

*Notes:* Replication versus revised variable coding for the 2013 comparison.

**Table A12:** Alternative coding: satisfaction with finding a pharmacy

| | Replication | | Revised coding | | |
|---|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI | Difference in significance? |
| Age | 0.91 | 0.81–1.02 | 0.95 | 0.81–1.02 | No |
| Gender | 1.19 | 1.06–1.33 | 1.15 | 1.06–1.32 | No |
| Hispanic | 0.95 | 0.79–1.15 | 0.38 | 0.81–1.17 | No |
| Non Hispanic Black | 0.54 | 0.44–0.68 | 0.71 | 0.43–0.67 | No |
| Income | 0.8 | 0.69–0.92 | 0.67 | 0.68–0.91 | No |
| High school | 0.78 | 0.68–0.89 | 0.77 | 0.69–0.89 | No |
| Less than highschool | 0.53 | 0.44–0.63 | 0.52 | 0.44–0.63 | No |
| HBP | 1.09 | 0.96–1.24 | 1.16 | 0.95–1.24 | No |
| High cholesterol | 1.08 | 0.97–1.22 | 1.09 | 0.97–1.22 | No |
| Diabetes | 0.99 | 0.88–1.12 | 1.08 | 0.88–1.12 | No |
| Heart disease | 1.08 | 0.91–1.28 | 1.00 | 0.91–1.28 | No |

*Continued on next page*

*Table A12* (*continued*)

| Variable | Replication | | Revised coding | | Difference in significance? |
|---|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI | |
| COPD | 1.13 | 0.97–1.32 | 1.01 | 0.97–1.32 | No |
| Heart failure | 1.27 | 1.01–1.59 | 1.01 | 1.00–1.58 | No |
| Depression | 0.97 | 0.85–1.12 | 1.01 | 0.84–1.12 | No |
| Cancer | 1.12 | 0.97–1.28 | 1.07 | 0.97–1.29 | No |
| Very good | 0.7 | 0.6–0.83 | 0.74 | 0.59–0.83 | No |
| Good | 0.47 | 0.39–0.56 | 0.53 | 0.39–0.56 | No |
| Fair | 0.41 | 0.34–0.5 | 0.54 | 0.34–0.50 | No |
| Poor | 0.42 | 0.31–0.56 | 0.40 | 0.31–0.56 | No |
| Private | 1.25 | 1.03–1.52 | 1.08 | 1.06–1.57 | No |
| Medicare Advantage | 1.21 | 1–1.46 | 1.16 | 1.03–1.50 | Yes |
| Medicaid | 1.43 | 1.17–1.74 | 1.54 | 1.27–1.94 | No |

*Notes:* Replication versus revised variable coding for the 2013 comparison.

**Table A13:** Alternative coding: not filling a prescription

| Variable | Replication | | Revised coding | | Difference in significance? |
|---|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI | |
| Age | 0.44 | 0.37–0.52 | 0.61 | 0.36–0.52 | No |
| Gender | 1.25 | 1.01–1.54 | 1.39 | 1.02–1.53 | No |
| Hispanic | 0.97 | 0.7–1.34 | 1.05 | 0.65–1.24 | No |
| Non Hispanic Black | 1.04 | 0.73–1.46 | 1.09 | 0.73–1.47 | No |
| Income | 1.71 | 1.41–2.08 | 1.53 | 1.42–2.08 | No |
| High school | 1.13 | 0.93–1.38 | 1.02 | 0.93–1.37 | No |
| Less than highschool | 1.15 | 0.84–1.56 | 1.18 | 0.84–1.55 | No |
| HBP | 0.94 | 0.73–1.2 | 1.10 | 0.73–1.21 | No |
| High cholesterol | 1.24 | 1.02–151 | 1.13 | 1.02–1.51 | No |
| Diabetes | 1.19 | 0.94–1.49 | 1.35 | 0.95–1.49 | No |
| Heart disease | 0.99 | 0.73–1.33 | 1.15 | 0.73–1.33 | No |
| COPD | 1.25 | 1.06–1.71 | 1.74 | 1.06–1.70 | No |
| Heart failure | 1.07 | 0.78–1.47 | 1.75 | 0.79–1.48 | No |
| Depression | 1.64 | 1.32–2.03 | 1.54 | 1.31–2.03 | No |
| Cancer | 0.97 | 0.77–1.21 | 1.42 | 0.77–1.21 | No |
| Very good | 1.09 | 0.75–1.58 | 1.53 | 0.75–1.58 | No |
| Good | 1.61 | 1.18–2.21 | 2.26 | 1.18–2.22 | No |
| Fair | 2.46 | 1.76–3.43 | 2.62 | 1.76–3.41 | No |
| Poor | 2.54 | 1.68–3.84 | 2.63 | 1.69–3.84 | No |
| Private | 0.59 | 0.46–0.76 | 0.78 | 0.43–0.81 | No |
| Medicare Advantage | 0.89 | 0.72–1.11 | 1.10 | 0.66–1.19 | No |
| Part D | 0.99 | 0.69–1.4 | 1.69 | 0.73–1.36 | No |
| Medicaid | 0.46 | 0.34–0.63 | 0.42 | 0.31–0.64 | No |

*Notes:* Replication versus revised variable coding for the 2013 comparison.

**Table A14:** Alternative coding: other cost-coping behaviours

| | Replication | | Revised coding | | |
|---|---|---|---|---|---|
| Variable | OR | 95% CI | OR | 95% CI | Difference in significance? |
| Age | 0.63 | 0.52–0.77 | 0.64 | 0.52–0.77 | No |
| Gender | 1.03 | 0.86–1.24 | 1.16 | 0.84–1.21 | No |
| Hispanic | 0.83 | 0.54–1.3 | 0.87 | 0.52–1.23 | No |
| Non Hispanic Black | 1.04 | 0.73–1.49 | 1.42 | 0.75–1.54 | No |
| Income | 1.6 | 1.22–2.11 | 2.08 | 1.26–2.17 | No |
| High school | 0.86 | 0.7–1.06 | 0.84 | 0.70–1.06 | No |
| Less than highschool | 0.81 | 0.58–1.13 | 0.89 | 0.58–1.13 | No |
| HBP | 0.61 | 0.47–0.8 | 0.84 | 0.48–0.80 | No |
| High cholesterol | 1.18 | 0.92–1.52 | 1.13 | 0.92–1.51 | No |
| Diabetes | 1.26 | 0.98–1.61 | 1.61 | 0.98–1.61 | No |
| Heart disease | 1.07 | 0.78–1.47 | 2.32 | 0.77–1.46 | No |
| COPD | 1.75 | 1.34–2.28 | 1.35 | 1.35–2.30 | No |
| Heart failure | 0.96 | 0.71–1.3 | 1.31 | 0.71–1.30 | No |
| Depression | 2.09 | 1.62–2.7 | 1.48 | 1.63–2.72 | No |
| Cancer | 0.92 | 0.74–1.14 | 1.41 | 0.74–1.14 | No |
| Very good | 1.22 | 0.84–1.78 | 1.26 | 0.83–1.76 | No |
| Good | 1.66 | 1.2–2.31 | 1.66 | 1.19–2.30 | No |
| Fair | 3.1 | 2.11–4.57 | 1.69 | 2.08–4.55 | No |
| Poor | 2.67 | 1.7–4.19 | 1.68 | 1.70–4.18 | No |
| Private | 0.72 | 0.56–0.93 | 0.81 | 0.62–1.17 | Yes |
| Medicare Advantage | 0.89 | 0.69–1.13 | 1.08 | 0.75–1.39 | No |
| Part D | 1.16 | 0.73–1.84 | 1.04 | 1.04–1.86 | Yes |
| Medicaid | 0.52 | 0.35–0.76 | 0.53 | 0.38–0.84 | No |

*Notes:* Replication versus revised variable coding for the 2013 comparison.

No significant differences are observed between those models for all ethnicity, SES and health variables. However, there are some variations in terms of health insurance coverage plans' significance. This can be explained by the fact that the new model adopts a broader definition of what constitutes a Part D enrollee which is closer to the definition adopted in other related papers [42] and which has an operational definition that can be faithfully replicated for the year 2020. Details regarding the new encoding method can be found under the section "operational definitions of variables used" Section B.

## B Operational definitions

### B.1 Demographic and socioeconomic variables

While names can be different, all these variables are structured in the same way. The same questions and answer options were presented to the respondents.

**Table A15:** Demographic and socioeconomic variable definitions

| Variable | 2013 definition | 2020 definition |
|---|---|---|
| Age | iv_age | dem_age |
| Gender | iv_sex | dem_sex |
| Ethnicity | iv_race | dem_race |
| Income | d_icome | dem_income |
| Education | d_edu | dem_edu |

## B.2 Health and chronic conditions

**Table A16:** Health variable definitions

| Variable | 2013 definition | 2020 definition |
|---|---|---|
| Health status | hlt_genhelth | hlt_genhelth |
| High blood pressure | hlt_ochbp | hlt_ochbp |
| Heart disease | hlt_occhd | hlt_occhd |
| Heart failure | hlt_occfail | hlt_occfail |
| Cancer | hlt_occancer | hlt_occancer |
| Diabetes | hlt_ocbetes | hlt_ocbetes |
| Depression | hlt_ocdeprss | hlt_ocdeprss |
| COPD | hlt_ocemphys | hlt_ocemphys |
| High Cholesterol | hlt_occholes | hlt_occholes |

## B.3 Health-insurance coverage

### *B.3.1 Coding used in the replication*

**Table A17:** Prescription-drug coverage in the replication

| Variable | 2013 definition |
|---|---|
| Medicare Advantage | ins_mhmorx |
| Private | ins_privrx |
| Medicaid | ins_d_mcaid |
| Part D | ins_part_d |
| no coverage | regroups all individuals who do not belong to previous categories |

### *B.3.2 Prescription-drug coverage in the cross-year comparison*

**Table A18:** Prescription-drug coverage in the cross-year comparison

| Variable | 2013 definition | 2020 definition |
|---|---|---|
| Medicare Advantage | ins_mhmorx | ins_madvrxht |
| Private | ins_privrx | ins_privrx |
| Medicaid | adm_op_mdcd | adm_op_mdcd |
| Part D | adm_partd (excluding individuals who have medicaid, a private insurance plan or a medicare advantage plan) | adm_partd (excluding individuals who have medicaid, a private insurance plan or a medicare advantage plan) |
| no coverage | regroups all individuals who do not belong to previous categories | regroups all individuals who do not belong to previous categories |

The new definition for Part D is based on a recent report on the demographic profile of Medicare Part D beneficiaries [43] and has been adapted to reflect the need of this study as best as possible.

### B.4 Service utilisation

**Table A19:** Service-utilisation variable definitions

| Variable | 2013 definition | 2020 definition |
|---|---|---|
| Skilled nursing facility use | adm_h_snfsty | adm_h_snfsty |
| Inpatient service use | adm_h_inpsty | adm_h_inpsty |
| Outpatient service use | adm_h_outsw | adm_h_outsw |

### B.5 Medication access

**Table A20:** Medication-access variable definitions

| Variable | 2013 definition | 2020 definition |
|---|---|---|
| Satisfaction Amount | acc_mcamtpay | rxs_mcamtpay |
| Satisfaction Drug list | acc_mcdrglst | rxs_mcdrglst |
| Satisfaction finding pharmacy | acc_mcfndpcy | rxs_mcfndpcy |
| No fill | acc_nofillrx | rxs_nofillrx |
| Took a smaller dose | acc_skiprx | rxs_skiprx |
| Skipped a dose | acc_mcfndpcy | rxs_mcfndpcy |
| Cost-Coping behavior | union of the previous two variables | union of the previous two variables |

In the logistic regression model, satisfaction variables are simplified to take the form of binary variables where only individuals who declare themselves to be ”very satisfied” are given the value of one. This can be considered a limitation compared to more advanced multinomial logistic regression models, but this process was the one applied in the 2013 study replicated and was necessary to obtain clearer insights.

The same process is applied to variables linked to other dependent variables: individuals with the value ”often” or ”sometimes” are considered ones and all others are considered zeros.