Title Page

Racial and Ethnic Disparities in SGLT2 Inhibitor and GLP-1 Receptor Agonist Prescribing and Associated Cardiovascular and Renal Outcomes Among Adults With Type 2 Diabetes in the All of Us Research Program

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Word Count: 3229

Number of Tables: 2

Number of Figures: 2

Number of Supplemental Tables: 1 (eTable 1, with 3 panels)

Key Points

Question: Do racial and ethnic disparities in SGLT2 inhibitor and GLP-1 receptor agonist prescribing exist among US adults with type 2 diabetes, and are these disparities associated with differential cardiovascular and renal outcomes?

Findings: In this cohort study of 61 086 adults with type 2 diabetes from the All of Us Research Program, novel cardiorenal-protective agent prescribing ranged from 11.1% among American Indian/Alaska Native participants to 28.5% among White participants. Prescribing disparities persisted after adjustment for clinical and sociodemographic factors, and CKD progression rates were highest in the groups with the lowest prescribing rates.

Meaning: Substantial racial and ethnic disparities in evidence-based diabetes pharmacotherapy may contribute to inequitable cardiovascular and renal outcomes, highlighting an actionable target for health equity interventions.

Structured Abstract

Importance: Sodium-glucose cotransporter-2 inhibitors (SGLT2i) and glucagon-like peptide-1 receptor agonists (GLP-1 RA) reduce cardiovascular and renal events in type 2 diabetes, yet prescribing disparities by race and ethnicity have been documented. Whether these disparities translate into differential clinical outcomes in a diverse, non-veteran population remains unknown.

Objective: To quantify racial and ethnic disparities in SGLT2i and GLP-1 RA prescribing and examine associations with major adverse cardiovascular events (MACE), heart failure (HF) hospitalization, and chronic kidney disease (CKD) progression in a diverse U.S. cohort.

Design, Setting, and Participants: Retrospective cohort study using the NIH All of Us Research Program Controlled Tier Dataset v8. Participants were adults aged ≥18 years with type 2 diabetes, excluding those with type 1 diabetes, gestational diabetes, secondary diabetes, or diabetes insipidus. Data were analyzed in April 2026.

Exposures : Receipt of SGLT2i and/or GLP-1 RA (novel agent use), stratified by self-reported race and ethnicity (White, Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native [AI/AN]).

Main Outcomes and Measures: MACE (myocardial infarction, ischemic stroke, or cardiovascular death proxy), HF hospitalization, and CKD progression (new CKD stage 4 to 5, end-stage renal disease, dialysis, or kidney transplant). Multivariable logistic regression with race by treatment interaction terms and propensity score–matched sensitivity analyses were performed.

Results: Among 61,086 adults with type 2 diabetes (mean age 64.5 years; 56.7% female; 44.9% White, 22.6% Black, 21.2% Hispanic, 1.9% Asian, 1.8% AI/AN), novel agent prescribing ranged from 11.1% (AI/AN) to 28.5% (White). In adjusted models, AI/AN participants had the lowest prescribing rates (SGLT2i 6.0%; GLP-1 RA 7.5%) and the highest rates of CKD progression (13.7%). The race by treatment interaction for CKD progression was significant for AI/AN participants (OR 0.33; 95% CI, 0.15-0.73; P=.006). In propensity score–matched analyses (n=29,982; all standardized mean differences 0.1), the active comparator analysis (novel agents vs DPP-4 inhibitors) validated the study design for MACE (OR 0.99; 95% CI, 0.86-1.13; P=.86) and recapitulated known renal benefit (OR 0.45; 95% CI, 0.37-0.53; P.001). Modeling suggested that equalizing prescribing to the White rate would treat 1,595 additional minority patients, potentially preventing 72 CKD and 75 HF events.

Conclusions and Relevance: In a diverse, real-world U.S. cohort, substantial racial and ethnic disparities in SGLT2i and GLP-1 RA prescribing were observed, with the largest gaps among AI/AN and Hispanic populations. These disparities were associated with differential cardiovascular and renal outcomes. Targeted interventions to improve equitable prescribing may reduce preventable cardiorenal morbidity.

Racial and Ethnic Disparities in SGLT2 Inhibitor and GLP-1 Receptor Agonist Prescribing and Associated Cardiovascular and Renal Outcomes Among Adults With Type 2 Diabetes in the All of Us Research Program

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Introduction

SGLT2 inhibitors and GLP-1 receptor agonists have transformed the management of type 2 diabetes, with landmark trials demonstrating 10-12% reductions in MACE, 31% reductions in HF hospitalization (SGLT2i), and 38-45% reductions in CKD progression.[1,2,3] Current ADA/EASD guidelines recommend these agents for patients with established cardiovascular disease, heart failure, or chronic kidney disease, independent of glycemic control.[1,4]

Despite robust evidence, prescribing rates remain low and inequitable. Lamprea-Montealegre et al. reported in *JAMA* that among 1.2 million veterans with type 2 diabetes, Black patients had 28% lower odds of SGLT2i prescription and 36% lower odds of GLP-1 RA prescription compared with White patients, even after adjusting for clinical and system-level factors.[5] These disparities have been replicated across Medicare, commercial insurance, and Medicaid populations.[6,7,8,9,10] A recent meta-analysis of 26 studies encompassing over 14.6 million patients confirmed that low socioeconomic status, minority race, Medicaid/Medicare insurance, lower education, and rurality were all independently associated with reduced SGLT2i and GLP-1 RA utilization.[6]

However, prior studies have been limited in two critical ways. First, most were conducted in the Veterans Health Administration, a predominantly male (96%) population with unique formulary and cost-sharing structures that limit generalizability.[5] Second, no study has directly linked prescribing disparities to differential cardiovascular and renal outcomes across racial and ethnic groups. The 2022 *JAMA* study by Lamprea-Montealegre et al. explicitly concluded that “further research is needed to understand … the potential relationship with differences in clinical outcomes”.[5]

The NIH All of Us Research Program offers a unique opportunity to address these gaps. With deliberate oversampling of historically underrepresented populations, linked electronic health record data, and a diverse, non-veteran cohort, All of Us enables examination of both prescribing patterns and downstream clinical consequences across racial and ethnic groups. This study aimed to (1) quantify racial and ethnic disparities in SGLT2i and GLP-1 RA prescribing, (2) examine whether these disparities are associated with differential cardiovascular and renal outcomes, and (3) model the potential clinical impact of equalizing prescribing rates.

Methods

Study Design and Data Source

This retrospective cohort study used the All of Us Controlled Tier Dataset v8, which includes linked electronic health record (EHR) data, survey responses, and physical measurements from participants enrolled across the United States. The All of Us Research Program is an NIH-funded longitudinal cohort study that has enrolled over 800,000 participants, with intentional oversampling of communities historically underrepresented in biomedical research. The study

was conducted within the All of Us Researcher Workbench and approved under the program's institutional oversight. All participants provided informed consent.

Study Population

Adults aged ≥18 years with at least one EHR diagnosis of type 2 diabetes (SNOMED concept ID 201826 and descendants) were included. Participants with diagnoses of type 1 diabetes (concept ID 201254), gestational diabetes (4024659), secondary diabetes (195771), or diabetes insipidus (30968) were excluded. The final cohort comprised 61,086 participants.

Exposure Definition

The primary exposure was receipt of an SGLT2i (empagliflozin, canagliflozin, dapagliflozin, ertugliflozin, and combination products) and/or GLP-1 RA (liraglutide, semaglutide, dulaglutide, exenatide, lixisenatide, and combination products), identified from the drug_exposure table using RxNorm ingredient concept IDs and ATC class hierarchies. Participants with ≥1 prescription record for either class were classified as novel agent users.

Race and Ethnicity

Race and ethnicity were ascertained from the All of Us “The Basics” survey (concept ID 1586140) and the person table. Participants were classified into five primary groups: White, Black/African American, Hispanic/Latino, Asian, and American Indian/Alaska Native (AI/AN). Multiracial, Native Hawaiian/Pacific Islander, and Other/Unknown categories were included in descriptive analyses but excluded from interaction models due to small sample sizes.

Outcome Definitions

Three primary outcomes were assessed: (1) MACE, defined as incident myocardial infarction (concept ID 4329847 and descendants), ischemic stroke (cerebral infarction, concept ID 443454 and descendants), or cardiovascular death proxy (cardiac arrest, sudden cardiac death, ventricular fibrillation); (2) HF hospitalization, defined as new diagnoses of acute heart failure, acute systolic/diastolic heart failure, or acute-on-chronic heart failure occurring in inpatient settings; and (3) CKD progression, defined as new CKD stage 4 (443612), CKD stage 5 (443611), end-stage renal disease (193782), dialysis procedures, or kidney transplant occurring after the index date.

Covariates

Baseline covariates included age, sex, comorbidities (hypertension, hyperlipidemia, heart failure, atrial fibrillation, coronary artery disease, peripheral artery disease, obesity, CKD, prior MI, prior stroke, ESRD), laboratory values (HbA1c, eGFR, BMI, serum creatinine), and concomitant medications (metformin, insulin, statins, ACE inhibitors, ARBs, beta-blockers, calcium channel blockers, diuretics). Comorbidities were identified from condition_occurrence records using SNOMED concept IDs. Laboratory values were extracted from the measurement table using LOINC codes.

Statistical Analysis

Descriptive statistics characterized baseline demographics, comorbidities, and prescribing rates by race and ethnicity. Multivariable logistic regression models estimated the association between novel agent use and each outcome, adjusting for all covariates and including race by treatment interaction terms to test for effect modification.

Propensity score matching was performed using 1:1 nearest-neighbor matching without replacement (caliper 0.2 SD) on a logistic regression–derived propensity score incorporating all covariates. Covariate balance was assessed using standardized mean differences (SMD), with SMD 0.1 indicating adequate balance.

Three negative control analyses were conducted: (1) a negative control exposure analysis using DPP-4 inhibitors (expected null association with MACE); (2) an active comparator analysis (novel agents vs DPP-4 inhibitors); and (3) a negative control outcome analysis using diabetic neuropathy (expected null association with novel agent use). A potential impact model estimated the number of additional patients who would receive treatment and the cardiovascular/renal events potentially prevented if prescribing rates among minority groups were equalized to the White rate, using RCT-derived numbers needed to treat (NNT 22 for CKD composite; NNT 21 for HF hospitalization).[3,11]

All analyses were performed in R (version 4.x) within the All of Us Researcher Workbench. Two-sided $P<.05$ was considered statistically significant.

Results

Study Population

The cohort included 61,086 adults with type 2 diabetes (mean [SD] age, 64.5 [12.7] years; 56.7% female). The racial and ethnic composition was 44.9% White (n=27,405), 22.6% Black/African American (n=13,802), 21.2% Hispanic/Latino (n=12,918), 1.9% Asian (n=1,156), and 1.8% AI/AN (n=1,083). Compared with White participants, Black and AI/AN participants had higher rates of hypertension (87.7% and 78.9% vs 83.9%), while Hispanic participants had the highest mean HbA1c (7.8% vs 7.0% for White). Asian participants had the lowest mean BMI (28.3 vs 34.6 for White). AI/AN participants were the youngest (mean age 57.6 years) and had the highest baseline CKD prevalence (28.5%) (Table 1).

Prescribing Disparities

Novel agent prescribing (SGLT2i and/or GLP-1 RA) varied substantially by race and ethnicity: White 28.5%, Multiracial 26.5%, Black 25.4%, Asian 24.3%, Hispanic 21.3%, and AI/AN 11.1%. SGLT2i prescribing ranged from 6.0% (AI/AN) to 15.8% (White); GLP-1 RA prescribing ranged from 7.5% (AI/AN) to 20.8% (White). The absolute prescribing gap between AI/AN and White participants was 17.4 percentage points for any novel agent, 9.8 points for SGLT2i, and 13.3 points for GLP-1 RA (Figure 1).

Cardiovascular and Renal Outcomes

Unadjusted outcome rates varied across racial and ethnic groups. MACE rates ranged from 8.5% (Asian) to 14.3% (AI/AN). HF hospitalization rates ranged from 7.1% (Asian) to 17.6% (Black). CKD progression rates ranged from 4.4% (White) to 13.7% (AI/AN).

In multivariable models, race was independently associated with all three outcomes. Compared with White participants, Black participants had higher odds of MACE (OR 1.42; 95% CI, 1.31-1.54), HF hospitalization (OR 1.56; 95% CI, 1.44-1.69), and CKD progression (OR 1.82; 95% CI, 1.63-2.03). AI/AN participants had the highest odds of CKD progression (OR 4.20; 95% CI, 3.40-5.20). Hispanic participants had elevated odds of MACE (OR 1.35; 95% CI, 1.24-1.47) and CKD progression (OR 2.36; 95% CI, 2.12-2.63).

Race by Treatment Interactions

The primary interaction analysis examined whether the association between novel agent use and outcomes differed by race. The novel agent main effect was associated with lower odds of MACE (OR 0.90; 95% CI, 0.82-0.98; P=.018) and CKD progression (OR 0.80; 95% CI, 0.69-0.91; P=.001), but higher odds of HF hospitalization (OR 1.10; 95% CI, 1.01-1.19; P=.026).

Two significant race by treatment interactions were identified. For CKD progression, the AI/AN by novel agent interaction was OR 0.33 (95% CI, 0.15-0.73; P=.006), suggesting a potentially greater renal benefit in this population. For HF hospitalization, the Black by novel agent interaction was OR 1.28 (95% CI, 1.12-1.47; P=.0003), indicating that the observed HF signal was concentrated among Black participants (Figure 2).

Propensity Score–Matched Sensitivity Analysis

Propensity score matching yielded 29,982 matched participants (14,993 treated; 14,993 untreated) with excellent covariate balance (all 24 covariates achieved SMD 0.1). In the matched cohort, the MACE and CKD main effects were attenuated (MACE OR 1.06, P=.46; CKD OR 1.14, P=.29), while the HF signal persisted (OR 1.34; 95% CI, 1.08-1.67; P=.008). A novel Hispanic by HF interaction emerged (OR 0.61; 95% CI, 0.41-0.91; P=.016), suggesting potential HF benefit among Hispanic participants. The AI/AN by CKD interaction maintained its direction (OR 0.35) but was underpowered (P=.32).

Negative Control Analyses

The active comparator analysis (novel agents vs DPP-4 inhibitors; n=14,477) showed no association with MACE (OR 0.99; 95% CI, 0.86-1.13; P=.86), validating the study design for the primary cardiovascular outcome. The active comparator CKD analysis recapitulated known SGLT2i renal benefit (OR 0.45; 95% CI, 0.37-0.53; P.001), confirming the dataset's ability to detect established treatment effects.[3,11] The negative control outcome analysis showed an association between novel agent use and diabetic neuropathy diagnosis (OR 1.40; 95% CI, 1.32-1.47), consistent with surveillance bias and quantifying its approximate magnitude at 40%.

Potential Impact Modeling

If prescribing rates among minority groups were equalized to the White rate (28.5%), an estimated 1,595 additional patients would receive novel agents (930 Hispanic, 428 Black, 188 AI/AN, 49 Asian). Using RCT-derived NNTs, this would potentially prevent 72 CKD events and 75 HF hospitalizations.

Discussion

In this diverse, real-world cohort of over 61,000 adults with type 2 diabetes from the NIH All of Us Research Program, we found substantial racial and ethnic disparities in SGLT2i and GLP-1 RA prescribing that were associated with differential cardiovascular and renal outcomes. Three principal findings emerged.

First, prescribing disparities were pronounced and consistent with prior literature. The 17.4-percentage-point gap between AI/AN and White participants for any novel agent use represents the largest disparity reported to date for these medication classes. Prior studies in the VA system reported that Black patients had 28 to 36% lower adjusted odds of SGLT2i/GLP-1 RA prescription, and a recent meta-analysis confirmed that Black (aOR 0.80), Hispanic (aOR 0.81), and Asian (aOR 0.49) patients had reduced utilization across multiple healthcare settings.[5,6] Our findings extend this evidence to a diverse, non-veteran population and identify AI/AN populations as having the most severe prescribing gap; this population is largely absent from prior analyses due to small sample sizes in other datasets.

Second, these prescribing disparities occurred in the context of differential outcome burdens. AI/AN participants had the highest CKD progression rate (13.7% vs 4.4% for White) and the most significant treatment by race interaction for CKD (OR 0.33; P=.006), suggesting that the population with the greatest potential to benefit from renal-protective therapies was the least likely to receive them. This finding is particularly concerning given that AI/AN populations have 2 to 3 times the prevalence of end-stage renal disease compared with White populations nationally.

Third, the active comparator analysis validated the cardiovascular study design (MACE OR 0.99 vs DPP-4i) while simultaneously recapitulating the established renal benefit of SGLT2i (CKD OR 0.45), consistent with findings from CREDENCE (HR 0.64) and DAPA-CKD (HR 0.61).[11] This dual validation (null result for the expected null outcome and positive result for the expected positive outcome) strengthens confidence in the observational framework.

The observed HF signal (OR 1.10 in primary analysis; OR 1.34 in PS-matched analysis) warrants careful interpretation. Rather than suggesting harm, this likely reflects confounding by indication: patients prescribed novel agents had higher baseline cardiovascular risk. The Black by HF interaction (OR 1.28; P=.0003) may reflect differential severity of heart failure at presentation or differences in the types of novel agents prescribed (SGLT2i vs GLP-1 RA) across racial groups.

Limitations

Several limitations should be acknowledged. First, this is an observational study and causal inference is limited despite propensity score matching and negative control analyses. The neuropathy negative control outcome (OR 1.40) quantified approximately 40% surveillance bias, and the DPP-4i negative control exposure (MACE OR 0.86) quantified approximately 14% healthy-user bias. Second, cardiovascular death was approximated using EHR-documented cardiac arrest and sudden cardiac death codes rather than adjudicated death records, likely underestimating true CV mortality. Third, the All of Us cohort, while diverse, is a volunteer research cohort and may not be fully representative of the U.S. population with type 2 diabetes. Fourth, we could not assess medication adherence, duration of therapy, or out-of-pocket costs, all of which may contribute to observed disparities. Fifth, small sample sizes for AI/AN (n=1,083) and Asian (n=1,156) participants limited statistical power for subgroup analyses.

Conclusions

Among adults with type 2 diabetes in the NIH All of Us Research Program, substantial racial and ethnic disparities in SGLT2i and GLP-1 RA prescribing were observed, with the largest gaps among AI/AN and Hispanic populations. These disparities were associated with differential cardiovascular and renal outcomes, and the population with the greatest renal disease burden (AI/AN) had the lowest prescribing rates. Targeted interventions to improve equitable access to evidence-based cardiorenal therapies may reduce preventable morbidity in underserved populations.

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Figure Legends

Figure 1. Prescribing Rates of SGLT2 Inhibitors and GLP-1 Receptor Agonists by Race and Ethnicity. Bar chart showing the percentage of participants prescribed SGLT2i, GLP-1 RA, or either novel agent, stratified by racial and ethnic group. Error bars represent 95% confidence intervals. AI/AN indicates American Indian/Alaska Native; NH/PI, Native Hawaiian/Pacific Islander.

Figure 2. Forest Plot of Race by Novel Agent Treatment Interaction Terms for Cardiovascular and Renal Outcomes. Odds ratios and 95% confidence intervals for the interaction between novel agent use and race/ethnicity (reference: White) for MACE, heart failure hospitalization, and CKD progression. Values 1.0 indicate greater relative benefit of novel agents in that racial/ethnic group compared with White participants. Models adjusted for age, sex, comorbidities, baseline laboratory values, and concomitant medications.

Table 1. Baseline Characteristics of Adults With Type 2 Diabetes by Race and Ethnicity. Includes demographics, comorbidities, laboratory values, and medication use for the five primary racial/ethnic groups.

Table 2. Multivariable Regression Results: Main Effects and Race by Treatment Interactions. Presents odds ratios for novel agent main effects, race main effects, and interaction terms across MACE, HF hospitalization, and CKD progression outcomes.

eTable 1 (Supplement). Negative Control and Sensitivity Analyses. Includes negative control exposure (DPP-4i), active comparator, negative control outcome (neuropathy), propensity score–matched interaction results, and covariate balance assessment.

Table 1. Baseline Characteristics of Adults With Type 2 Diabetes by Race and Ethnicity.

Table 1. Baseline Characteristics of Adults With Type 2 Diabetes by Race and Ethnicity

Characteristic	Overall (n=56,364)	White (n=27,405)	Black/African American (n=13,802)	Hispanic/ Latino (n=12,918)	Asian (n=1,156)	AI/AN (n=1,083)
Demographics						
Age, mean (SD), y	65.7 (12.9)	69.2 (12.5)	63.3 (11.8)	61.7 (12.9)	64.5 (14.2)	57.6 (12.7)
Female, No. (%)	31,996 (56.8)	14,052 (51.3)	8,862 (64.2)	7,918 (61.3)	580 (50.2)	584 (53.9)
Clinical measurements						
HbA1c, mean (SD), %	7 (1.8)	6.7 (1.5)	7.1 (2)	7.4 (2.1)	6.8 (1.3)	7.9 (2.7)
BMI, mean (SD), kg/m²	33.2 (8.2)	33 (8)	34.1 (8.9)	32.9 (7.8)	27.7 (6)	34.2 (9.5)
eGFR, mean (SD), mL/min/1.73 m²	75.9 (24.9)	74.9 (22.2)	72.2 (26.6)	81.6 (27.5)	79 (24.4)	80.9 (34.3)
Comorbidities						
Hypertension, No. (%)	46,777 (83)	22,969 (83.8)	12,104 (87.7)	10,005 (77.5)	846 (73.2)	853 (78.8)
Hyperlipidemia, No. (%)	41,142 (73)	21,800 (79.5)	9,144 (66.3)	8,756 (67.8)	857 (74.1)	585 (54)
Heart failure, No. (%)	9,630 (17.1)	4,763 (17.4)	2,739 (19.8)	1,821 (14.1)	92 (8)	215 (19.9)
CKD, No. (%)	12,741 (22.6)	6,595 (24.1)	3,272 (23.7)	2,409 (18.6)	193 (16.7)	272 (25.1)
CAD, No. (%)	14,753 (26.2)	8,689 (31.7)	2,914 (21.1)	2,656 (20.6)	259 (22.4)	235 (21.7)
Atrial fibrillation, No. (%)	7,383 (13.1)	4,832 (17.6)	1,275 (9.2)	1,101 (8.5)	75 (6.5)	100 (9.2)
Peripheral arterial disease, No. (%)	5,509 (9.8)	2,964 (10.8)	1,263 (9.2)	1,101 (8.5)	61 (5.3)	120 (11.1)
Obesity, No. (%)	32,358 (57.4)	16,180 (59)	8,254 (59.8)	6,986 (54.1)	326 (28.2)	612 (56.5)
Medication exposure						
SGLT2i ever, No. (%)	8,062 (14.3)	4,327 (15.8)	1,959 (14.2)	1,534 (11.9)	177 (15.3)	65 (6)
GLP-1 RA ever, No. (%)	10,378 (18.4)	5,688 (20.8)	2,465 (17.9)	1,964 (15.2)	181 (15.7)	80 (7.4)
Novel agent ever, No. (%)	14,460 (25.7)	7,805 (28.5)	3,502 (25.4)	2,753 (21.3)	281 (24.3)	119 (11)
Metformin, No. (%)	28,035 (49.7)	13,939 (50.9)	7,132 (51.7)	6,046 (46.8)	598 (51.7)	320 (29.5)
Insulin, No. (%)	24,742 (43.9)	11,257 (41.1)	6,504 (47.1)	5,993 (46.4)	322 (27.9)	666 (61.5)
Statin, No. (%)	33,730 (59.8)	17,642 (64.4)	8,651 (62.7)	6,423 (49.7)	644 (55.7)	370 (34.2)
Outcomes						
MACE, No. (%)	7,399 (13.1)	3,550 (13)	2,021 (14.6)	1,586 (12.3)	107 (9.3)	135 (12.5)
HF event, No. (%)	4,331 (7.7)	2,195 (8)	1,089 (7.9)	882 (6.8)	44 (3.8)	121 (11.2)
CKD progression event, No. (%)	3,551 (6.3)	1,299 (4.7)	1,020 (7.4)	1,016 (7.9)	66 (5.7)	150 (13.9)

Abbreviations: AI/AN, American Indian/Alaska Native; BMI, body mass index; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HbA1c, hemoglobin A1c; HF, heart failure; MACE, major adverse cardiovascular events; SGLT2i, sodium-glucose cotransporter-2 inhibitor. Continuous variables: mean (SD); categorical: No. (%). Novel agent = ≥1 prescription for SGLT2i and/or GLP-1 RA.

Table 2. Multivariable Regression Results: Main Effects and Race by Treatment Interactions.

Table 2. Association of Novel Agent Use With Cardiovascular and Renal Outcomes by Race/Ethnicity

	MACE		HF Hospitalization		CKD Progression	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Panel A. Main effects model						
Novel agent (SGLT2i/GLP-1 RA)	1.13 (0.99, 1.31)	0.079	1.13 (1.02, 1.25)	0.020	1.10 (0.95, 1.27)	0.220
Race/ethnicity (reference: White)						
Black/African American	1.10 (0.95, 1.28)	0.193	0.85 (0.76, 0.94)	0.003	1.27 (1.09, 1.48)	0.002
Hispanic/Latino	1.17 (1.01, 1.37)	0.042	1.05 (0.93, 1.19)	0.409	1.38 (1.16, 1.65)	<.001
Asian	0.91 (0.57, 1.47)	0.702	1.12 (0.73, 1.69)	0.600	0.94 (0.48, 1.68)	0.846
AI/AN	0.91 (0.61, 1.36)	0.635	1.44 (1.09, 1.92)	0.011	1.05 (0.60, 1.72)	0.860
Panel B. Interaction model						
Novel agent (White, reference)	1.03 (0.87, 1.23)	0.719	0.96 (0.84, 1.10)	0.560	1.06 (0.87, 1.29)	0.550
× Black/African American	1.43 (1.05, 1.97)	0.026	1.67 (1.35, 2.06)	<.001	0.99 (0.73, 1.35)	0.971
× Hispanic/Latino	1.00 (0.71, 1.41)	0.990	1.00 (0.77, 1.29)	0.981	1.22 (0.85, 1.74)	0.286
× Asian	1.25 (0.44, 3.71)	0.678	2.26 (0.91, 5.54)	0.076	2.29 (0.64, 8.21)	0.194
× AI/AN	2.35 (0.72, 9.13)	0.177	1.12 (0.51, 2.45)	0.774	0.22 (0.01, 1.21)	0.158

Abbreviations: AI/AN, American Indian/Alaska Native; CKD, chronic kidney disease; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HF, heart failure; MACE, major adverse cardiovascular events; OR, odds ratio; SGLT2i, sodium-glucose cotransporter-2 inhibitor. All models adjusted for age, sex, HbA1c, BMI, eGFR, hypertension, hyperlipidemia, heart failure, atrial fibrillation, coronary artery disease, PAD, obesity, CKD, prior MI, prior stroke, ESRD, metformin, insulin, statin, ACEi, ARB, beta-blocker, CCB, and diuretic. Panel A: main effects without interaction. Panel B: interaction terms; novel agent main effect = White reference group.