INSURANCE-BASED TRENDS IN INSULIN UTILIZATION, ADHERENCE, AND OUT-OF-POCKET SPENDING IN THE UNITED STATES, 2016-2023

HSD103

Caleb Ochimana, BPharm., MBA, MPH, Ph.D. (c)[1,2]; Robert Ohsfeldt, Ph.D.[1,2]; Benjamin Ukert, Ph.D.[2]; Alva O. Ferdinand, DrPH, JD [1,2]
Jason E. Maddock, Ph.D. [3]
1 Southwest Rural Health Research Center, Texas A&M University, 2 Department of Health Policy and Management, School of Public Health, Texas A&M University, 3 Department of Environmental & Occupational Health, School of Public Health, Texas A&M University

TEXAS A&M UNIVERSITY
School of Public Health

Background

- Insulin affordability and access remain central U.S. health policy concerns, particularly amid rising diabetes prevalence and recent cost-sharing reforms.
- Over 40 million have diabetes and over 8.4 million uses insulin.
- Insulin prices have risen dramatically over the past two decades.
- Rising insulin prices have increased financial burden among adults with diabetes
- High out-of-pocket insulin costs contribute to medication nonadherence.
- While federal and state policies have sought to improve insulin affordability, national evidence on long-term trends in insulin utilization, adherence, and patient out-of-pocket (OOP) spending across insurance groups remains limited.
- This study examine national trends in insulin utilization, medication adherence, and out-of-pocket (OOP) spending among U.S. adults from 2016 to 2023, and to assess differences by insurance status in the context of evolving insulin affordability policies.

Methods

Data Sources:

- We conducted a nationally representative repeated cross-sectional trend analysis using the Medical Expenditure Panel Survey (MEPS) from 2016 through 2023.
- Insulin use was identified from the Prescribed Medicines files and linked to person-level characteristics from the Full-Year Consolidated files.

Study Population: 18 years and older with type 1 or type 2 diabetes using insulin

Exposure: Out-of-Pocket Cost per prescription (inflation-adjusted to 2023 US dollars).

Outcomes: Prescription fills, Adherence

Covariates: Insurance category, year, age, sex, race/ethnicity, education, region, poverty level, non-insulin drugs

Statistical Analysis:

Descriptive analyses summarized sample characteristics overall and by insurance type using survey-weighted means for continuous variables and survey-weighted percentages for categorical variables. Group differences were assessed using:

- Survey-weighted Wald tests for continuous variables
- Rao-Scott design-adjusted χ^2 tests (design-based F statistics) for categorical variables
- Multivariable regression analyses included: Survey-weighted logistic regression for insulin adherence
- All statistical tests were two-sided, with statistical significance defined as $P < .05$.

Results

- The analytic sample included 5,993 insulin users, representing approximately 7.4 million insulin users nationally after application of survey weights.
- Uninsured individuals consistently faced the highest OOP insulin costs, which increased from approximately $70 per prescription in 2016 to more than $220 in 2023.

Table 1. Sample Characteristics Among Insulin Users by Insurance Type, 2016–2023

Characteristic	Overall	Private Insurance	Medicare	Medicaid	Dual Eligible	Uninsured
Sample size (unweighted), No.	5,993	1,615	2,505	712	961	200
Population estimate (weighted), millions	7.4	2.4	3.1	0.8	0.9	0.2
Insurance type (%)	--	26.9	41.8	11.9	16.0	3.3
Age, mean (SE), y	61.4 (0.33)	50.8 (0.51)	72.2 (0.23)	48.6 (0.92)	67.0 (0.69)	49.6 (1.41)
Female, %	49.1	48.2	44.1	56.9	62.3	52.9
Out-of-pocket cost per prescription, Mean (95% CI), $US	26.6 (24.4-28.9)	32.4 (29.4-35.4)	27.1 (25.6-28.7)	3.2 (1.4-5.1)	7.5 (4.3-10.8)	114.8 (56.8-172.9)
Prescription Fills, Mean (95% CI)	45.36 (43.4-47.3)	36.7 (34.4-39.0)	44.8 (42.8-46.8)	58.0 (51.1-65.0)	64.9 (57.6-72.2)	30.4 (25.7-35.2)
Proportion of days covered (PDC), Mean (95% CI)	55.8 (54.2-57.3)	50.5 (47.8-53.3)	60.4 (58.1-62.7)	50.2 (45.5-54.8)	56.8 (52.9-60.8)	59.8 (52.6-67.0)
Adherence (PDC ≥80%), Mean (95% CI)	39.2 (37.4-40.9)	32.3 (29.3-35.3)	44.6 (41.8-47.4)	35.6 (30.4-40.9)	41.5 (37.1-46.0)	38.2 (28.5-47.9)
Race/Ethnicity, %						
Non-Hispanic White	60.1	62.7	69.8	39.8	41.0	35.4
Non-Hispanic Black	16.1	14.1	13.9	26.1	21.4	14.1
Hispanic	16.2	15.7	10.1	24.0	27.5	42.3
Non-Hispanic Asian	3.2	2.5	3.2	3.2	5.8	2.3
Non-Hispanic Other	4.3	5.0	3.0	7.0	4.3	5.9
Education, %						
Less than high school	19.6	10.3	17.3	30.5	40.0	42.1
High school graduate	32.6	31.1	31.6	38.7	34.5	33.3
Some college or higher	25.8	28.0	27.9	20.1	19.1	18.3
Bachelor+	22.0	30.7	23.2	10.7	6.4	6.3

Figures 1. Out-of-Pocket Spending Per Insulin Prescription by Insurance Category, 2016–2023

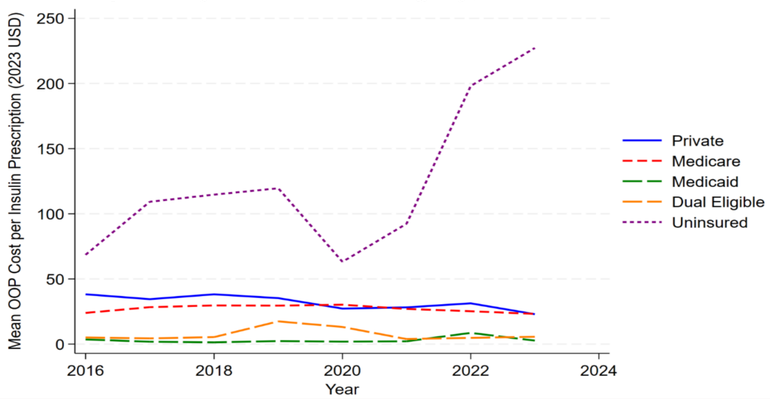

Figure 2: Prescription Counts by Insurance Category, 2016-2023

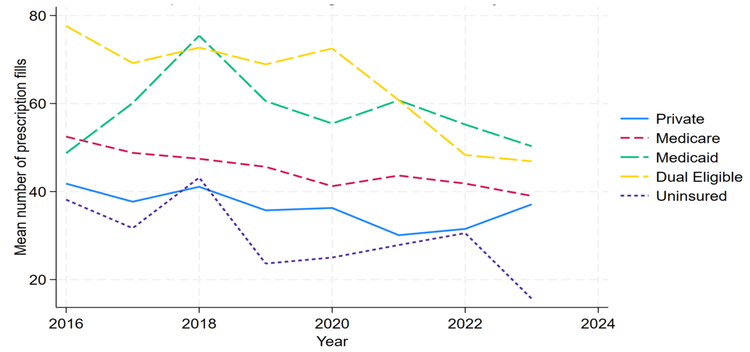

Table 2. Association Between Insulin Affordability, Insurance Type, and Adherence (PDC ≥80%) Among U.S. Adults, 2016–2023

Variable	Odds Ratio (95% CI)	P Value
Out-of-pocket cost per insulin prescription per $10 increase (2023 USD)	0.93 (0.89– 0.97)	.001
Insurance Type (Ref: Private)		
Medicare	1.60 (1.25–2.05)	<.001
Medicaid	1.30 (0.96–1.75)	.09
Dual Eligible	1.64 (1.23–2.18)	.001
Uninsured	1.17 (0.75–1.81)	.50

- Each $10 increase in OOP cost was associated with a 1.5 percentage point decrease in the probability of adherence (95% CI, 0.6–2.4 percentage points decrease; P = .001).
- Subgroup analyses showed that this inverse association was consistently observed within each insurance group. A $10 increase in OOP cost was associated with decreases in adherence of 1.4 percentage points among privately insured individuals,1.6 percentage points among Medicare beneficiaries, 1.5 percentage points among Medicaid beneficiaries,1.6 percentage points among dual-eligible individuals, and 1.4 percentage points among uninsured individuals (all P ≤ .001).
- Compared with privately insured individuals, Medicare beneficiaries (OR, 1.60; 95% CI, 1.25–2.05) and dual-eligible individuals (OR, 1.64; 95% CI, 1.23–2.18) had higher odds of adherence, whereas adherence did not differ significantly among Medicaid beneficiaries or uninsured individuals

Conclusion

- In this nationally representative study, insulin affordability varied substantially by insurance type, with uninsured individuals facing the greatest financial burden.
- Higher OOP insulin costs were associated with lower adherence and reduced insulin use, highlighting the importance of reducing financial barriers to improve access to diabetes medications.