

# Disparities in Health Care Use Among Low-Salary and High-Salary Employees

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**T**he Medicare Prescription Drug Improvement and Modernization Act of 2003 established tax-sheltered health savings accounts (HSA) for high-deductible health plans (HDHPs) to incentivize individuals to save for health care needs and to consciously shop for health care services. The legislation led to a subsequent shift from traditional plans with low deductibles to HDHPs by employers and health insurance plans, with 15% of all private health plans classified as an HDHP in 2007 and 44% by 2017.<sup>1,2</sup>

Proponents of HDHPs argue that they tend to have lower total premiums and lower out-of-pocket (OOP) premiums for employees and they retain the traditional value of insurance, protecting employees from large health care expenses with limits on total OOP spending. At the same time, they reduce health care spending by exposing consumers to the full price of care for low levels of medical spending. The RAND Health Insurance Experiment showed that increased cost sharing decreased utilization and spending without resulting in adverse health outcomes.<sup>3</sup> A recent study among high-income earners has also shown that switching to an HDHP has resulted in limited differential changes in medical spending across income.<sup>4</sup> HDHPs also provide incentives to shop for less costly service providers, given the widely documented variation of health care cost even within the same geographic area.<sup>5</sup>

Opponents of HDHPs argue that exposing employees to the full cost of care discourages potentially necessary and preventable health care services, especially when the deductible for families can reach more than \$4000.<sup>6</sup> Studies that evaluate increases in cost-sharing provisions have found negative effects on medication adherence and even increases in mortality.<sup>7,8</sup> These effects may be amplified among lower-salary employees, who may avoid or delay health care spending simply because they may not have enough savings to cover relatively minor procedures or because they anticipate high OOP costs, especially in a system that operates with unpredictable pricing and out-of-network billing tactics.<sup>9-11</sup> Additional complications emerge through the well-established link between health and social determinants of health.<sup>12</sup> Thus, lower-salary individuals generally have a higher prevalence of chronic conditions, and this factor, combined with OOP spending concerns,

## ABSTRACT

**OBJECTIVES:** To examine how health care utilization and spending vary for low-income employees compared with high-income employees enrolled in an employer-sponsored high-deductible health plan (HDHP).

**STUDY DESIGN:** We use commercial medical claims data and administrative human resource data from a large employer between 2014 and 2018. We link the administrative data, which include details on salary and other benefit choices, to each employee in each year with medical claims. Our variables of interest include medical spending and utilization outcomes grouped into different care settings.

**METHODS:** Using multivariate regressions, we estimate the association between salary buckets and health care utilization and spending, controlling for demographic characteristics, comorbidities of employees, human resource health plan benefits, and geography.

**RESULTS:** Employees earning less than \$75,000 show lower rates of utilization and spending on preventive measures, such as outpatient visits and prescription drugs, while having higher rates of utilization of preventable and avoidable emergency department visits and inpatient stays, resulting in lower overall health care spending among lower-salary employees.

**CONCLUSIONS:** Low-salary employees enrolled in HDHPs have higher rates of acute care utilization and spending but lower rates of primary care spending compared with high-salary employees. Results suggest that HDHPs discourage routine physician-patient care among low-salary employees.

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suggests that lower-salary individuals should be instead encouraged to utilize more health care services to adequately treat their comorbidities compared with high-salary individuals.<sup>13-15</sup>

Therefore, the aim of this study was to evaluate health care utilization and spending along the salary distribution for employees enrolled in an HDHP. We use medical and pharmacy claims data linked to employer administrative data that include precise employee salary and a variety of human resource information to adjust for differences in sociodemographic characteristics, health plan benefit design (such as employee medical plan premiums), geography, and baseline health status of employees.

There is limited research describing how individuals continuously covered by an HDHP differentially utilize health care. The best evidence to date uses self-reported salary or US Census estimates.<sup>16-21</sup> For example, one study found that HDHPs affected spending similarly for low-salary employees and high-salary employees.<sup>16</sup> Other research has shown that lower-salary families enrolled in HDHPs were more likely than high-salary families to delay or forgo care due to costs.<sup>17</sup> Research also found an association between lower socioeconomic status and inappropriate reductions in high-acuity emergency department (ED) visits and longer delays in breast cancer care.<sup>19,20</sup> However, earlier work also found that women of low socioeconomic status enrolled in HDHPs experienced no statistically significant detectable changes in rates of cervical and breast cancer screenings.<sup>22</sup>

## METHODS

### Data and Study Sample

We used commercial medical and pharmacy claims and administrative data from a large national employer between 2014 and 2018. The employer operates in the health care industry and has more than 60,000 employees residing in all states, most of whom can be considered as holding professional jobs. For each employee covered by the employer-sponsored health insurance plan, we followed their compensation history with the employer, as well as their health plan enrollment and their medical and pharmacy claims history. Medical and pharmacy claims data for the employer were obtained from the HealthCore Integrated Research Environment, a repository of fully adjudicated claims data for approximately 70 million health plan members across the United States. We limit the data to employees enrolled in a medical plan for the full plan year (January 1 to December 31) between 2014 and 2018.

The employer's administrative data included demographic information on employee gender, age, annual salary (salary is the actual salary earned by the employee during the calendar year, exclusive of bonuses), employment status (part time vs full time), length of tenure with the company, and race/ethnicity (White, Black, Hispanic, Asian,

other). Health plan benefit design elements included the chosen consumer-directed health plan (CDHP) (HDHP with an HSA), the tier (employee vs family plan), associated deductible, coinsurance rate, and OOP maximum. We also observed the health insurance premiums paid by the employee and employer and the HSA and flexible spending account (FSA) contributions by employee and employer.

### HDHP Options

Employees at the company had the choice of 3 CDHPs with a similar provider network in all years of the study. Plans differed only in cost sharing and employee premiums. Plan A was the most generous plan with the lowest deductible, lowest maximum OOP, and lowest OOP coinsurance rate, but highest employee premium. Plan B had about a 30% higher deductible, 17% higher maximum OOP, 10% higher coinsurance rate, and, on average, 25% lower employee premiums. Plan C was the least generous plan with the highest deductible, the highest maximum OOP, and the least generous coinsurance coverage, although it had the lowest employee premium. The plan tier selection (ie, employee vs family plan) affected the premium, deductible, maximum OOP, and employer contribution to the HSA/health reimbursement account (HRA) (although the employer contribution across all plans was similar and very generous). Premiums also increased with salary, although low-salary employees paid very similar premiums for all 3 plans, which should lead to higher enrollment in the most generous health plan compared with higher-salaried employees' enrollment in the most generous health plan.

### Salary Variables

Our independent variables of interest are binary variables indicating the salary level of the employee for the year. We use the employee's base salary for the year, excluding bonuses. The median salary was \$61,013 with an IQR of \$42,000 to \$85,100, and the highest salaries were truncated at \$200,000. We categorize employees into 4 salary bins: those earning less than \$50,000, \$50,000 to \$74,999, \$75,000 to \$100,000, and more than \$100,000. The inclusion of binary variables, rather than a continuous salary variable, has the advantage of allowing for nonlinear effects of salary on health care utilization. Results using alternative bins are presented in [eAppendix Tables 1 and 2](#) (eAppendix available at [ajmc.com](http://ajmc.com)).

## TAKEAWAY POINTS

- ▶ Social determinants of health are a growing topic of interest in the health insurance market because they have been shown to be associated with health care spending and health outcomes.
- ▶ High-deductible health plans shift the cost of care to plan holders. This can lead to reduced utilization of care. High-deductible health plans have potential negative consequences for individuals earning a low salary.
- ▶ We compared employees along the salary distribution to compare health care spending and utilization and show that low-salary individuals spend less on outpatient care but have more visits and higher spending at emergency departments.
- ▶ Additional work is needed to align health care needs with access to care and to the appropriate provider setting.

## Outcome Variables

Our primary outcome variables measure health care utilization and spending trends for each employee in each quarter. Specifically, we create binary and continuous utilization measures for inpatient stays, outpatient visits, ED visits, and prescription fills. Health care spending is defined as the total amount (plan paid, patient paid, and any payments by secondary payers) of medical expenses associated with inpatient stays, outpatient visits, ED visits, and prescription fills. We log the spending variables to account for the skewness of high health care utilizers and to facilitate the ease of interpretation of the results.

To classify ED visits by medical urgency, we used the New York University ED algorithm.<sup>23,24</sup> The algorithm assigns probabilities to ED visit as urgent (ED needed), emergent but preventable or avoidable (preventable ED care where the condition could have been prevented or avoided with timely and effective ambulatory care), emergent but primary care treatable (care could be provided in a primary care setting), and nonemergent (immediate care not required). We allocated each visit to 1 of the 4 categories related to emergency status when the assigned probability of the algorithm was 100% for said category. We also classified inpatient visits based on the Agency for Healthcare Research and Quality's Prevention Quality Indicators (PQIs), which identify whether an inpatient stay could have been avoided had high-quality ambulatory care been provided.<sup>25</sup> Ten different inpatient conditions can be marked as a preventable inpatient stay, and we evaluate the cumulative number of inpatient stays for all PQI conditions.

## Control Variables

We create control variables from the medical plan information, including plan choice, tier, coinsurance rate, deductible level, OOP maximum, annual employee premium payment, annual employee and employer HSA contribution, and total FSA contributions. These variables account for differential behavior over time stemming from varying incentives to consume health care.<sup>3,4,26,27</sup> We also include age, gender, and the Elixhauser Comorbidity Index score, which indicates diagnosis of a high-expenditure chronic disease or condition (eg, cancer, diabetes, mental health diagnoses).<sup>28</sup> The administrative data provide additional control variables that include employees' full-time employment status (reference group: part time), tenure with the employer (measured in years), and race/ethnicity (measured with binary indicators for White, Black, Hispanic, Asian, and other). We also include binary variables for the state of residence, year, and quarter to account for geographic differences in access and health care spending, seasonality of care seeking and sickness, and year-specific trends.

## Analysis

We used multivariate regression analyses to estimate the association of salary with health care spending and utilization at the employee-quarter level. The first set of regressions estimate linear probability models, where the dependent variable is a binary indicator for

whether the employee receives any type of care within a quarter for the aforementioned health care utilization variables. The second set of regressions estimate ordinary least squares (OLS) models, with the number of encounters for each outcome as the dependent variable. For spending outcomes, we use generalized linear models, with a log-link and gamma distribution. We transformed the coefficients of interests with  $e^{\text{coefficient}}$  minus 1 to correctly interpret the percentage change. [eAppendix Tables 3 through 5](#) present results from sensitivity analysis for our binary outcomes using logit models for binary outcomes, negative binomial models for continuous utilization outcomes, and log-transformed spending outcome OLS models. Our independent variables of interest are binary variables indicating whether the employee earned less than \$50,000, \$50,000 to \$74,999, or more than \$100,000 per year in salary, with \$75,000 to \$100,000 as the reference category. In all multivariate regressions, we included the full set of control variables to adjust for confounding that cover demographic, region, and health plan benefit elements. State, quarter, and year fixed effects were included to account for differences by state and time in spending and care utilization. We conducted all analyses using Stata 15 (StataCorp LP).

This study was conducted in full compliance with relevant provisions of the Health Insurance Portability and Accountability Act. Because researchers used only analytic files derived from a limited data set to perform the analyses as defined by the Privacy Rule 45 CFR 164.514(e), no waiver of informed consent or exemption was needed from an institutional review board.

# RESULTS

## Descriptive Statistics

In total, our study sample includes 448,012 employee-quarter observations, representing utilization patterns for 33,470 employees between 2014 and 2018. Individuals in the higher-salary groups (ie, salary of \$75,000-\$100,000 and > \$100,000) were more likely to be men (27.5% and 50.2%, respectively) and more likely to identify as White (73.5% and 77.6%) or Asian (7.0% and 10.5%) than those in the lower-salary groups ([Table 1](#)). Higher-salary employees (\$75,000-\$100,000 and > \$100,000) were healthier relative to lower-salary employees, with a smaller proportion having 3 or more Elixhauser comorbidities (15.3% and 11.7%). Higher-salary employees were more likely to have family plans that include either their spouse, their children, or both (59% and 69%). In terms of health plan choice, approximately the same percentage of employees across the salary categories were enrolled in health plan B; however, the employees in the highest-salary group were much more likely to be enrolled in the least generous plan C (18.1%). Lastly, those earning more than \$100,000 contributed more money to both their HSA/HRA and FSA (\$2045 and \$401, respectively) compared with lower-salary employees earning less than \$50,000 (\$1037 and \$163).

In terms of health care utilization, 1.6% of employees had an inpatient stay during the quarter, 4.0% had an ED visit, 63% had at least 1 outpatient visit, and 65% had at least 1 prescription filled

during the quarter. On average, an employee had 3.4 outpatient visits and 3.6 prescription fills per quarter. Across salary groups, outpatient care utilization was similar, although low-salary employees were more likely to use inpatient and ED care. Mean quarterly medical spending equaled \$1535, large seasonality across years in spending between the last quarter of the year and the first quarter of the following year was prevalent (with high spending in the last quarter and low spending in the first quarter), and the majority (64%) of spending occurred in the outpatient setting (\$989). Low-salary employees had higher quarterly average spending on inpatient (\$500) and ED (\$156) visits compared with those in higher-salary groups.

### Health Care Utilization

The linear probability model results show that employees earning less than \$50,000 had a 0.14-percentage-point lower probability ( $P = .01$ ) of having an inpatient stay relative to employees earning \$75,000 to \$100,000 in a given quarter (Table 2). The lowest-salary group also had a 1.8-percentage-point higher probability of visiting the ED during the quarter ( $P < .01$ ), a 4.3-percentage-point lower probability of having an outpatient visit ( $P < .001$ ), and a 1.8-percentage-point lower probability of filling a prescription during the quarter ( $P < .01$ ). On the other hand, the highest-salary group had a 1.3-percentage-point higher probability of an outpatient visit ( $P < .01$ ) and a 1.4-percentage-point higher probability of filling a prescription ( $P < .01$ ) relative to the \$75,000-to-\$100,000 salary group during the quarter.

The lowest-salary group had 0.022 more ED visits ( $P < .01$ ) per quarter relative to the reference group (Table 2). The lower 2 salary groups also had significantly fewer outpatient visits per quarter, with 0.43 and 0.16 fewer visits per quarter ( $P < .01$  for both), whereas the highest-salary group had 0.2 more outpatient visits ( $P < .01$ ) during the quarter. Lastly, the lower-salary groups had 0.22 and 0.13 fewer prescription fills ( $P < .01$  for both), whereas the highest-salary group had 0.12 more prescription fills ( $P < .01$ ) during the quarter.

### Health Care Spending

For total medical spending, plan and member paid, only enrollees in the \$50,000-to-\$74,999 salary group had 6% lower spending ( $P < .01$ )

**TABLE 1.** Demographics, Employment, and Health Plan Information for All Employees and Separately for Each Salary Group\*

	Full sample	<\$50,000	\$50,000-\$74,999	\$75,000-\$100,000	>\$100,000	Test for differences by salary group
Observations	448,012	165,024	130,922	78,830	73,236	
Age groups in years						$P < .001$
18-30	13.5%	21.1%	11.3%	8.5%	5.8%	
31-50	54.2%	53.5%	56.1%	53.2%	53.5%	
51-64	29.8%	23.5%	30.2%	35.4%	37.3%	
> 64	2.5%	1.9%	2.4%	2.9%	3.4%	
Gender						$P < .001$
Male	23.9%	15.7%	17.5%	27.5%	50.2%	
Female	76.1%	84.3%	82.5%	72.5%	49.8%	
Race/ethnicity						$P < .001$
White	66.1%	56.3%	67.5%	73.5%	77.6%	
Black	17.3%	26.9%	16.0%	10.6%	5.3%	
Hispanic	8.0%	10.6%	8.9%	5.4%	3.4%	
Asian	4.7%	1.9%	3.6%	7.0%	10.5%	
Other	3.9%	4.3%	4.0%	3.5%	3.2%	
Elixhauser score						$P < .001$
0	47.5%	47.6%	44.6%	47.0%	52.7%	
1	23.2%	22.3%	23.7%	24.1%	23.5%	
2	13.8%	14.1%	14.6%	13.6%	12.1%	
≥ 3	15.5%	16.0%	17.1%	15.3%	11.7%	
Full-time employment status						$P < .001$
Full time	98.9%	98.4%	99.0%	99.6%	99.1%	
Part time	1.1%	1.6%	1.0%	0.4%	0.9%	
Salary						
< \$50,000	36.8%					
\$50,000-\$74,999	29.2%					
\$75,000-\$100,000	17.6%					
> \$100,000	16.4%					
Tenure (years)						$P < .001$
< 3	22.7%	28.3%	23.5%	17.4%	14.2%	
3-4	16.4%	18.5%	16.3%	15.1%	13.3%	
5-10	22.7%	25.4%	19.2%	22.4%	23.5%	
> 10	38.2%	27.8%	41.0%	45.1%	49.0%	
Plan tier						$P < .001$
Only employee	43.1%	48.4%	44.6%	41.0%	31.0%	
Employee + spouse	11.5%	9.6%	11.2%	13.3%	14.5%	
Employee + children	23.2%	27.3%	24.0%	20.4%	15.7%	
Employee + family	22.1%	14.7%	20.2%	25.3%	38.8%	
Plan type						$P < .001$
Plan A	63.1%	69.3%	64.7%	59.5%	50.0%	
Plan B	29.6%	28.0%	29.7%	30.8%	31.9%	
Plan C	7.3%	2.7%	5.6%	9.7%	18.1%	

(continued)

**TABLE 1.** (Continued) Demographics, Employment, and Health Plan Information for All Employees and Separately for Each Salary Group\*

	Full sample	<\$50,000	\$50,000-\$74,999	\$75,000-\$100,000	>\$100,000	Test for differences by salary group
Plan information						
HRA or HSA contribution	\$1334	\$1037	\$1228	\$1470	\$2045	
FSA contribution	\$263	\$163	\$269	\$336	\$401	
Medical utilization						
Inpatient visits	0.02	0.02	0.02	0.02	0.01	
ED visits	0.05	0.07	0.04	0.03	0.03	
Outpatient visits	3.43	3.25	3.62 <sub>τ</sub>	3.58	3.33	
Prescription fills	3.57	3.67	3.81	3.50	2.95	
Medical spending						
Total medical spending	\$1535	\$1611	\$1581	\$1478	\$1346	
Inpatient spending	\$434	\$500	\$439	\$369	\$345 <sub>τ</sub>	
ED spending	\$110	\$156	\$102	\$77	\$59	
Outpatient spending	\$989	\$953	\$1037 <sub>τ</sub>	\$1030	\$940	
Prescription drug spending	\$484	\$453	\$508 <sub>τ</sub>	\$507	\$486	
ED utilization type						
Nonemergent	0.017	0.025	0.015	0.012	0.009	
Primary care treatable	0.007	0.010	0.006	0.005	0.004	
Preventable	0.003	0.005	0.003	0.002	0.001	
ED needed	0.006	0.009	0.006	0.005	0.004	
Preventable inpatient visit						
PQI index	0.015	0.019	0.016	0.014	0.010	

ED, emergency department; FSA, flexible spending account; HRA, health reimbursement account; HSA, health savings account; PQI, Prevention Quality Indicator.

\*P values from  $\chi^2$  tests are displayed for categorical variables by comparing each salary group with the reference salary group (\$75,000-\$100,000). P values from t tests were performed for binary and continuous variables by comparing each salary group with the reference salary group, and  $\tau$  indicates that the salary group mean is not different from the reference group mean.

relative to employees earning \$75,000 to \$100,000. The highest-salary employees spent 8% more on their health care ( $P < .01$ ) relative to those earning \$75,000 to \$100,000 (Table 3). Within service categories, the lowest-salary group spent 40% more on ED care ( $P < .01$ ) compared with the reference group, and the lower 2 salary groups spent significantly less on outpatient care (14% and 8%, respectively;  $P < .01$  for both) and prescription drugs (10% and 5%;  $P < .01$  and  $P < .02$ , respectively). The highest-salary group spent 7% more on outpatient visits ( $P < .01$ ) and 17% more for prescription drugs ( $P < .01$ ) compared with the reference group.

### Preventable ED and Inpatient Stays

The probability and number of nonemergent ED visits were higher among the lowest-salary employees, with little differential visit trends in all other salary bins (Table 4). Similar results were found

for primary care–treatable and preventable ED visits, where the lowest-salary group had higher visit rates compared with the reference group. Findings also reveal that the lowest-salary group had more ED visits that require ED care, suggesting that they may have a higher prevalence of conditions such as chest pain. Comparing preventable inpatient stays across salary groups showed that the lowest-salary group had a higher probability and number of preventable inpatient admissions.

## DISCUSSION

In this study we found that low-salary employees, especially those earning less than \$50,000 per year, utilize significantly fewer outpatient services and prescriptions compared with employees earning \$75,000 to \$100,000 in salary. Low-salary employees, however, have significantly higher inpatient and ED service use. The lowest-salary employees had 40% higher total medical spending on ED care but less spending on outpatient care and prescription drugs. In contrast, those earning more than \$100,000 a year were generally more likely to seek outpatient care and prescriptions compared with employees earning \$75,000 to \$100,000 per year. The utilization and cost results indicate that lower-salary employees utilize care differently than higher-salary employees in a way that suggests suboptimal care-seeking behavior.

Higher ED care use, especially for preventable conditions, and lower outpatient care use for low-salary employees may point to substitution of what would typically be considered a

more appropriate setting for nonemergent conditions—physician offices. It is also possible that lower-salaried individuals do not receive the right amount of condition management. These findings are reiterated by the fact that we also found higher preventable inpatient stays. At the same time, a lower probability of pharmacy use and spending among low earners also suggests that the cost of prescriptions may be a barrier to filling prescriptions; however, we observe higher pharmacy fills, potentially implying that those who fill prescriptions are more likely to use cheaper generics. The differentially signed total pharmacy fills and spending results may reflect that those who consider filling a single prescription may be less likely to do so (extensive margin), whereas those who commonly fill prescriptions (intensive margin) are much more likely to fill prescriptions relative to employees earning \$75,000 to \$100,000. Additional qualitative and quantitative work is needed

**TABLE 2.** Association Between Salary Groups and Health Care Utilization<sup>a</sup>

Probability of service use	Inpatient stay	Emergency department visit	Outpatient visit	Prescription fill
<\$50,000	0.0014* (0.0003-0.0026)	0.0179*** (0.0162-0.0196)	-0.0433*** (-0.0475 to -0.0392)	-0.0175*** (-0.0215 to -0.0136)
\$50,000-\$74,999	0.0002 (-0.0009 to 0.0013)	0.0019* (0.0003-0.0034)	-0.0140*** (-0.0180 to -0.0101)	-0.0062** (-0.0100 to -0.0025)
\$75,000-\$100,000	Ref	Ref	Ref	Ref
>\$100,000	0.0008 (-0.0004 to 0.0020)	0.0023** (0.0006-0.0040)	0.0128*** (0.0081-0.0175)	0.0144*** (0.0099-0.0188)
Total number of encounters	Inpatient stays	Emergency department visits	Outpatient visits	Prescription fills
<\$50,000	0.0018** (0.0004-0.0031)	0.0222*** (0.0201-0.0242)	-0.4301*** (-0.4821 to -0.3781)	0.2202*** (0.1806-0.2599)
\$50,000-\$74,999	0.0003 (-0.0010 to 0.0015)	0.0015 (-0.0004 to 0.0033)	-0.1568*** (-0.2065 to -0.1072)	0.1316*** (0.0942-0.1690)
\$75,000-\$100,000	Ref	Ref	Ref	Ref
>\$100,000	0.0014* (0.0000-0.0028)	0.0031** (0.0011-0.0052)	0.2002*** (0.1383-0.2622)	-0.1146*** (-0.1557 to -0.0735)
Observations	445,929	445,929	445,929	445,929

Ref, reference.

\*P < .05; \*\*P < .01; \*\*\*P < .001.

<sup>a</sup>Each column represents results from a separate linear probability model for the binary dependent variables and results from linear models for the continuous dependent variables. 95% CIs are shown below each coefficient.

**TABLE 3.** Association Between Salary Groups and Health Care Spending<sup>a</sup>

Log total spending	Total medical spending	Inpatient spending	Emergency department spending	Outpatient spending	Prescription spending
<\$50,000	-0.0359 (-0.0761 to 0.0044)	0.0668 (-0.1137 to 0.2473)	0.3337*** (0.2494-0.4180)	-0.1320*** (-0.1701 to -0.0938)	-0.0925*** (-0.1359 to -0.0492)
\$50,000-\$74,999	-0.0571** (-0.0949 to -0.0193)	-0.0662 (-0.2328 to 0.1004)	0.0692 (-0.0158 to 0.1541)	-0.0776*** (-0.1145 to -0.0407)	-0.0475* (-0.0886 to -0.0064)
\$75,000-\$100,000	Ref	Ref	Ref	Ref	Ref
>\$100,000	0.0738** (0.0284-0.1192)	-0.0992 (-0.3116 to 0.1132)	0.0037 (-0.1048 to 0.1121)	0.0634** (0.0207-0.1060)	0.1533*** (0.0959-0.2107)
Observations	445,929	445,929	445,929	445,929	445,929

Ref, reference.

\*P < .05; \*\*P < .01; \*\*\*P < .001.

<sup>a</sup>Each column represents results from a generalized linear model with a log link and a gamma distribution for the continuous dependent variable, and we display the coefficients of the independent variables from the regressions. 95% CIs are shown below each coefficient.

to understand the mechanism that could explain these differential care patterns between low- and high-salary employees.

To date, few studies have focused on vulnerable populations enrolled in HDHPs, which is important because they are especially exposed to high OOP medical spending relative to their income; this may be because of a lack of individual socioeconomic information matchable to claims data.<sup>28</sup> Our findings are in accord with work that found that HDHPs reduced utilization and spending for individuals of low socioeconomic status and evidence that lower-salary families enrolled in HDHPs were more likely to delay or forgo care due to costs than high-salary families.<sup>16,17</sup> Other work analyzed the impact of switching to an HDHP.<sup>4,18-20,29,30</sup> Some studies found negative consequences after the switch, such as reductions

in high-acuity ED visits, that were especially pronounced for low socioeconomic status groups, whereas other research did not find statistical evidence for differences in breast cancer and cervical cancer preventive care.<sup>18-20</sup>

Compared with previous studies that have focused on low-income individuals using geographic socioeconomic data, we perform comprehensive analyses that assess health care utilization and spending patterns by salary for employees in HDHPs across time using precise individual level earnings data.<sup>16,18,29</sup> We also used a much richer set of control variables compared with previous work to account for factors that influence health care plan choice and health care spending. The closest work to ours was performed by Sherman et al, who utilized wage data in 2014 from self-insured

**TABLE 4.** Association Between Salary Groups and Type of ED Visit and Preventable Inpatient Stays\*

Probability of service use	Nonemergent	PC treatable	Preventable	ED needed	Preventable inpatient visit
<\$50,000	0.0072*** (0.0006-0.0008)	0.0034*** (0.0027-0.0041)	0.0017*** (0.0012-0.0021)	0.0028*** (0.0021- 0.0035)	0.0012** (0.0004-0.0021)
\$50,000-\$74,999	0.0006 (-0.0004 to 0.0016)	0.0004 (-0.0003 to 0.0010)	0.0004 (-0.0001 to 0.0007)	0.0006 (-0.0001 to 0.0012)	0.0003 (-0.0005 to 0.0010)
\$75,000-\$100,000	Ref	Ref	Ref	Ref	Ref
> \$100,000	0.0015 (-0.0005 to 0.0026)	0.0006 (-0.0001 to 0.0014)	0.0001 (-0.0003 to 0.0005)	-0.0001 (-0.0008 to 0.0006)	0.0004 (-0.0005 to 0.0012)
Total number of encounters	Nonemergent	PC treatable	Preventable	ED needed	Preventable inpatient visit
<\$50,000	0.0079*** (0.0007-0.0091)	0.0038*** (0.0030-0.0045)	0.0017*** (0.0012-0.0022)	0.0032*** (0.0024-0.0039)	0.0032** (0.0011-0.0054)
\$50,000-\$74,999	0.0005 (-0.0005 to 0.0016)	0.0004 (-0.0003 to 0.0010)	0.0004 (-0.0001 to 0.0008)	0.0006 (-0.0001 to 0.0013)	0.0005 (-0.0015 to 0.0024)
\$75,000-\$100,000	Ref	Ref	Ref	Ref	Ref
> \$100,000	0.0019* (0.0006-0.0030)	0.0011** (0.0002-0.0018)	0.0002 (-0.0003 to 0.0006)	-0.0001 (-0.0008 to 0.0007)	-0.0001 (-0.0022 to 0.0020)
Observations	445,929	445,929	445,929	445,929	445,929

ED, emergency department; PC, primary care; ref, reference.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

\*Each column represents results from a separate linear probability model for the binary dependent variables and results from linear models for the continuous dependent variables. 95% CIs are shown below each coefficient.

employers, many of them located in the South.<sup>26</sup> They found significant disparities in spending, ED use, and hospitalizations, which are partially confirmed in our study. Medical spending was higher for the highest-salary group but lower for the lowest-salary group. We also observe significantly elevated levels of avoidable ED use for low-salary employees. However, the number of hospital admissions for the lowest- and highest-salary groups were both elevated relative to the middle-salary reference group.

The continued shift toward HDHPs can result in significant challenges for low-salary employees. Although CDHPs come with lower premiums for consumers, plans may realize higher medical expenses in the long run based on the complicated nature of their setups, misunderstanding of consumers, and consumers' liquidity constraints to pay for OOP expenses.<sup>31,32</sup> Additionally, evidence suggests that many employees prefer consumption smoothing (eg, consistent plan premium payments rather than large 1-time OOP medical payments). HDHPs reduce consumption smoothing by shifting high spending onto consumers at the time of care needs, whereas low-deductible plans shelter consumers from high OOP spending but require consistently high monthly premium payments. Consumers might even prefer low-deductible plans when total medical and premium spending would have been lower in an HDHP compared with the total medical and premium spending in a low-deductible plan.<sup>33</sup>

Work by Wharam et al suggests that rising health care costs could exacerbate the negative consequences of HDHPs on preventive care use for individuals of low socioeconomic status.<sup>19,20</sup> Payers and providers can counteract rising medical costs by improving

price transparency, especially for preventive services that might reduce costs in the long run. Payers may also reformulate HDHPs by providing generous HSA account contributions that cover most of the deductible for low-income employees. Health insurance literacy interventions, however, might need to accompany such changes to ensure that low-salary employees are aware of the benefits of HSAs.

### Limitations

This study has several limitations. First, the salary data that we use include information for only the employees of the firm, whereas the employee's household income may be higher due to the employment of other household members (such as the spouse). However, many studies on the value of HDHPs rely on Census estimates based on the geographic location of the employee's residence. Second, it is important to understand the household decision-making process of employees because health insurance coverage decisions are normally made at the household level, but we do not know the marital status or whether the employee had dependents unless their health plan covers family members. Third, the employees in this study are employed by a single firm in a single sector of the economy. It is possible that employees in different types of jobs and different sectors of the economy use health care differently, although the employer covers a variety of jobs across the United States. Fourth, the study is limited to claims data billed through employer-sponsored coverage, so care and prescriptions purchased without insurance are not captured in our data. Fifth, differences in health care use between low- and high-salary groups may not necessarily suggest that low-salary individuals underutilize care. It

is possible that higher-salary individuals overutilize care. However, previous work has shown little difference in health care use among low-salary and higher-salary groups, and in some cases there is evidence of overutilization for low-salary individuals.<sup>34,35</sup>

## CONCLUSIONS

This study fills an important gap in the literature by assessing the association of salary and care utilization when a HDHP is present. Understanding how HDHPs influence employees' health care decision-making, particularly for low-salary employees who may not have the liquidity to pay for high deductibles, is important because associational evidence has shown that HDHPs reduce medical care utilization. In this study, we found that lower-salary employees enrolled in an HDHP with an HSA through their employer spent significantly less on outpatient services and prescription fills compared with higher-salary employees. At the same time, low-salary employees spent significantly more on ED care. These results suggest that low-salary employees may be forgoing outpatient services and instead spending more in the ED compared with higher-salary employees when HDHPs are present. This pattern of health care utilization may lead to delayed diagnosis of health conditions and potentially miss the window and benefits of early diagnosis or prevention. ■

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eAPPENDIX

eAppendix Table 1. The Association between Different Salary Bins and Healthcare Utilization

<b>Probability of Service Use:</b>	<b>Inpatient Stay</b>	<b>ED Visit</b>	<b>Outpatient Visit</b>	<b>Prescription Fill</b>
<\$40,000	Ref	Ref	Ref	Ref
\$40,000-59,999	-.0011 (-.0023, .0002)	-.0150*** (-.0169, -.0131)	.0235*** (.0196, .0275)	.0082*** (.0044, .0119)
\$60,000-79,999	-.0017** (-.0029, -.0004)	-.0222*** (-.0243, -.0202)	.0445*** (.0403, .0488)	.0158*** (.0117, .0198)
\$80,000-\$99,999	-.0021** (-.0035, -.0007)	-.0229*** (-.0251, -.0207)	.0538*** (.0487, .0589)	.0240*** (.0191, .0288)
>=\$100,000	-.0011 (-.0026, .0004)	-.0210*** (-.0232, -.0041)	.0658*** (.0603, .0713)	.0356*** (.0303, .0408)
<b>Total Number of Encounters:</b>	<b>Inpatient Stays</b>	<b>ED Visits</b>	<b>Outpatient Visits</b>	<b>Prescription Fills</b>
<\$40,000	Ref	Ref	Ref	Ref
\$40,000-59,999	-.0011 (-.0025, .0003)	-.0191*** (-.0215, -.0166)	.1238*** (.0763, .1714)	-.1090*** (-.1476, -.0704)
\$60,000-79,999	-.0017* (-.0032, -.0002)	-.0287*** (-.0312, -.0262)	.4371*** (.3841, .4900)	-.0794*** (-.1219, -.0368)
\$80,000-\$99,999	-.0022** (-.0038, -.0005)	-.0283*** (-.0309, -.0256)	.4934*** (.4290, .5577)	-.2570*** (-.3052, -.2089)
>=\$100,000	-.0006 (-.0024, .0011)	-.0258*** (-.0287, -.0229)	.6902*** (.6160, .7643)	-.3463*** (-.3977, -.2950)
Observations	445,929	445,929	445,929	445,929

ED, emergency department; ref, reference.

\* $P < .05$ ; \*\*  $P < .01$ ; \*\*\* $P < .001$ .

Notes: Each column represents results from a separate linear probability model for the binary dependent variables and results from linear models for the continuous dependent variables. 95% CIs are shown below each coefficient.

**eAppendix Table 2.** The Association between Different Salary Bins and Type of ED Care and Preventable Inpatient Admissions

<b>Probability of Service Use:</b>	<b>Non-emergent</b>	<b>PC treatable</b>	<b>Preventable</b>	<b>ED Needed</b>	<b>Preventable Inpatient Visit</b>
<\$40,000	Ref	Ref	Ref	Ref	Ref
\$40,000-59,999	-.0072*** (-.0084, -.0059)	-.0027*** (-.0035, -.0019)	-.0014*** (-.0020, -.0009)	-.0020*** (-.0028, -.0013)	-0.0018*** (-.0026, -.0010)
\$60,000-79,999	-.0104**** (-.0116, -.0090)	-.0043*** (-.0052, -.0034)	-.0016*** (-.0022, -.0011)	-.0029*** (-.0037, -.0021)	-0.0020*** (-.0029, -.0011)
\$80,000-\$99,999	-.0097*** (-.0111, -.0083)	-.0044*** (-.0053, -.0035)	-.0020*** (-.0026, -.0014)	-.0035*** (-.0044, -.0027)	-0.0026*** (-.0035, -.0016)
>=\$100,000	-.0087*** (-.0102, -.073)	-.0038*** (-.0048, -.0028)	-.0019*** (-.0025, -.0013)	-.0035*** (-.0044, -.0026)	-0.0020*** (-.0031, -.0010)
<b>Total Number of Encounters:</b>	<b>Non-emergent</b>	<b>PC treatable</b>	<b>Preventable</b>	<b>ED Needed</b>	<b>Preventable Inpatient Visit</b>
<\$40,000	Ref	Ref	Ref	Ref	Ref
\$40,000-59,999	-.0081*** (-.0095, -.0066)	-.0031*** (-.0040, -.0021)	-.0015*** (-.0022, -.0009)	-.0022*** (-.0031, -.0014)	-0.0055** (-.0077, -.0033)
\$60,000-79,999	-.0116*** (-.0131, -.0101)	-.0049*** (-.0059, -.0039)	-.0018*** (-.0025, -.0012)	-.0033*** (-.0042, -.0025)	-0.0057*** (-.0081, -.0033)
\$80,000-\$99,999	-.0108*** (-.0124, -.0092)	-.0049*** (-.0059, -.0039)	-.0022*** (-.0029, -.0015)	-.0040*** (-.0049, -.0031)	-0.0073*** (-.0098, -.0047)
>=\$100,000	-.0095*** (-.0112, -.0079)	-.0039*** (-.0050, -.0027)	-.0020*** (-.0027, -.0014)	-.0039*** (-.0049, -.0029)	-0.0067*** (-.0096, -.0038)
	445,929	445,929	445,929	445,929	445,929

ED, emergency department; PC, primary care; ref, reference.

\* $P < .05$ ; \*\*  $P < .01$ ; \*\*\* $P < .001$ .

Notes: Each column represents results from a separate linear probability model for the binary dependent variables and results from linear models for the continuous dependent variables. 95% CIs are shown below each coefficient.

**eAppendix Table 3.** The Association between Salary Groups and the Probability of Care Utilization

<b>Probability of Service Use:</b>	<b>Inpatient Visit</b>	<b>ED Visit</b>	<b>Outpatient Visit</b>	<b>Prescription Fill</b>
<\$50,000	.0927* (.0136, .1718)	.4555*** (.4027, .5084)	-.2280*** (-.2497, -.2064)	-.1055*** (-.1284, -.0827)
\$50,000-74,999	.0240 (-.0525, .1005)	.0873** (.0345, .1402)	-.0744*** (-.0952, -.0535)	-.0359** (-.0579, -.0140)
\$75,000-\$100,000	Ref	Ref	Ref	Ref
>\$100,000	-.0036 (-.1036, .0964)	-.0010 (-.0691, .0670)	.0555*** (.0312, .0798)	.0653*** (.0399, .0908)
Observations	445,787	445,929	445,929	445,929

ED, emergency department; ref, reference.

\* $P < .05$ ; \*\*  $P < .01$ ; \*\*\* $P < .001$ .

Notes: Each column represents results from a separate Logistic regression model and displays the coefficients of the independent variables of interest. 95% confidence interval shown below each coefficient.

**eAppendix Table 4.** The Association between Salary Groups and the Number of Care Utilizations

<b>Total Number of Encounters:</b>	<b>Inpatient Visits</b>	<b>ED Visits</b>	<b>Outpatient Visits</b>	<b>Prescription Visits</b>
<\$50,000	.0970* (.0160, .1780)	.4510*** (.3983, .5037)	-.1379*** (-.1529, -.1229)	.0261*** (.0145, .0376)
\$50,000-74,999	.0170 (-.0606, .0946)	.0719** (.0186, .1252)	-.0548*** (-.0687, -.0408)	.0100 (-.0009, .0209)
\$75,000-\$100,000	Ref	Ref	Ref	Ref
>\$100,000	.0350 (-.0687, .1386)	-.0020 (-.0722, .0681)	.0655*** (.0483, .0827)	.0027 (-.0104, .0159)
Observations	445,929	445,929	445,929	445,929

ED, emergency department; ref, reference.

\* $P < .05$ ; \*\*  $P < .01$ ; \*\*\* $P < .001$ .

Notes: Each column represents results from a separate Negative Binomial regression model for the continuous dependent variable, and we displays the coefficients of the independent variables of interest. 95% confidence interval shown below each coefficient.

**eAppendix Table 5.** The Association between Salary Groups and the Healthcare Spending

<b>Log Total Spending:</b>	<b>Total Medical Spending</b>	<b>Inpatient Spending</b>	<b>Emergency Department Spending</b>	<b>Outpatient Spending</b>	<b>Prescription Spending</b>
<\$50,000	-.2511*** (-.2783, -.2235)	.0145* (.0033, .0257)	.1351*** (.1219, .1483)	-.3098*** (-.3365, -.2832)	-.1411*** (-.1627, -.1194)
\$50,000-74,999	-.0990*** (-.1249, -.0730)	.0023 (-.0083, .0128)	.0137* (.0017, .0256)	-.1060*** (-.1314, -.0806)	-.0522*** (-.0728, -.0316)
\$75,000-\$100,000	Ref	Ref	Ref	Ref	Ref
>\$100,000	.1119*** (.0811, .1426)	.0091 (-.0023, .0204)	.0166* (.0036, .0296)	.1038*** (.0737, .1339)	.0649*** (.0403, .0894)
Observations	445,929	445,929	445,929	445,929	445,929

Ref, reference.

\* $P < .05$ ; \*\*  $P < .01$ ; \*\*\* $P < .001$ .

Notes: Each column represents results from a log-transformed dependent variables of spending categories estimated with linear regression, and we displays the coefficients of the independent variables of interest. 95% confidence interval shown below each coefficient.