

Research Article

Determinants of and Trends in Total and Condition Specific Health Care Spending Per Privately Insured Adult

Kenneth E. Thorpe* and Robert W. Woodruff

Department of Health Policy and Management, Emory University, USA

***Corresponding author**

Kenneth E. Thorpe, Department of Health Policy and Management, Rollins School of Public Health, Emory University, USA, Tel: 404-277-2637

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OPEN ACCESS**Keywords**

- Multiple chronic conditions;
- Race and ethnicity;
- Private health care spending

Abstract

This paper examines the key factors associated with the level and changes in total spending per privately insured person 18-64 over the past decade. We also examine changes in out of pocket spending over time. This will include estimating the difference in out of pocket spending by race, gender, ethnicity as well as the mix of medical conditions under treatment. Nearly 160 million Americans are covered through employer sponsored insurance and just under 35 million through individual/nongroup plans.

INTRODUCTION

This paper examines the key factors associated with the level and changes in total spending per privately insured person 18-64 over the past decade. We also examine changes in out of pocket spending over time. This will include estimating the difference in out of pocket spending by race, gender, ethnicity as well as the mix of medical conditions under treatment. Nearly 160 million Americans are covered through employer sponsored insurance and just under 35 million through individual/nongroup plans [1]. Understanding trends in private insurance spending and the underlying factors associated with these trends provides important insights into the health care system overall.

The analysis starts by looking at trends in total per capita spending, total private insurance spending and out of pocket payments from 2010 through 2020. Then the analysis focuses on spending among patients with the most expensive medical conditions. This includes:

- Trauma
- Cancer
- Mental health disorders
- COPD/Asthma
- Heart Failure and Heart Disease

In addition, we examine the impact of multiple chronic conditions on the level and growth in private insurance spending over time.

MATERIALS AND METHODS

The analysis examines how changes in out of pocket spending, rising chronic disease prevalence, and other demographic factors affect total spending per capita. A major focus will be on trends and differences over time between Non-Hispanic White, Non-Hispanic Black, Non-Hispanic other adults and Hispanic Adults on the level and growth in health care spending.

Data for this analysis came from the 2010 - 2020 Medical Expenditure Panel Survey (MEPS-HC) medical conditions, events, and consolidated data files [2]. MEPS-HC is a nationally representative survey of the civilian noninstitutionalized population conducted by the Agency for Healthcare Research and Quality (AHRQ). The survey collects self-reported medical condition information, insurance coverage, patient demographics, health services utilization and health care spending.

We used the medical condition and event files to define eleven treated conditions used in our analysis: diabetes, hypertension, hyperlipidemia, mental health disorders, cancer, trauma, heart disease, rheumatoid arthritis, asthma, chronic kidney disease (CKD), and chronic obstructive pulmonary disease (COPD). The regression models focused on the top five conditions, heart disease, cancer, mental disorders, trauma and COPD/asthma. MEPS respondents self-reported medical conditions that were then professionally coded into ICD-9-CM diagnosis codes for years 2010 to 2015 and ICD-10-CM codes for 2016 to 2020. Clinical classification software was then used to collapse the ICD-9-CM codes into mutually exclusive clinical classification categories (CCC) for 2010 to 2015 and refined clinical classification software

was used to collapse the ICD-10-CM into mutually exclusive refined clinical classification categories (CCR) for 2018-2020. We defined each of the eleven conditions based on CCC (2010-2015), ICD-10-CM (2016-2017), and CCR (2018-2020) codes with one or more associated inpatient, outpatient, office-based, emergency department (ED), home health, or prescription medication health care event. (Appendix A).

Condition specific total spending included all spending on health care events that occurred during a given calendar year and were directly related to treating the condition. More specifically, we summed inpatient, outpatient, ED, office-based, home health, and prescription drug expenditures. When the health care event was associated with multiple conditions, the expenditures for that event were split evenly across the conditions.

Appendix A

Condition	2010 – 2015 Clinical Classifications Software Codes	2016 – 2017 ICD-10-CM Codes	2018 – 2020 Clinical Classifications Software Refined Codes
Diabetes	049 050	E08 E09 E10 E11 E13	END002 END003 END004 END005 END006
Hypertension	098 099	I10 I11 I12 I13 I15 I16	CIR007 CIR008
Hyperlipidemia	053	E78	END010
Mental Health	650 651 652 653 654 655 656 657 658 659 660 661 662 663	F06 F07 F09 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21 F22 F23 F24 F25 F28 F29 F30 F31 F32 F33 F34 F39 F40 F41 F42 F43 F44 F45 F48 F50 F52 F53 F54 F55 F59 F60 F63 F64 F65 F66 F68 F69 F70 F71 F72 F73 F78 F79 F80 F81 F82 F84 F88 F89 F90 F91 F93 F94 F95 F98 F99 K70 T36 T37 T38 T39 T40 T41 T42 T43 T44 T45 T46 T47 T48 T49 T50 T51 T52 T53 T54 T55 T56 T57 T58 T59 T60 T61 T62 T63 T64 T65 T71 X71 X72 X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83	MBD001 MBD002 MBD003 MBD004 MBD005 MBD006 MBD007 MBD008 MBD009 MBD010 MBD011 MBD012 MBD013 MBD014 MBD017 MBD018 MBD019 MBD020 MBD021 MBD022 MBD023 MBD024 MBD025 MBD026 MBD027 MBD028 MBD029 MBD030 MBD031 MBD032 MBD033 MBD034
Cancer	011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040 041 042 043 044 045	First 2 characters: C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 D0	NEO001 NEO002 NEO003 NEO004 NEO005 NEO006 NEO007 NEO008 NEO009 NEO010 NEO011 NEO012 NEO013 NEO014 NEO015 NEO016 NEO017 NEO018 NEO019 NEO020 NEO021 NEO022 NEO023 NEO024 NEO025 NEO026 NEO027 NEO028 NEO029 NEO030 NEO031 NEO032 NEO033 NEO034 NEO035 NEO036 NEO037 NEO038 NEO039 NEO040 NEO041 NEO042 NEO043 NEO044 NEO045 EO046 NEO047 NEO048 NEO049 NEO050 NEO051 NEO052 NEO053 NEO054 NEO055 NEO056 NEO057 NEO058 NEO059 NEO060 NEO061 NEO062 NEO063 NEO064 NEO065 NEO066 NEO067 NEO068 NEO069 NEO070 NEO071
Trauma	225 226 227 228 229 230 231 232 233 234 235 236 239 240 244	T79 T76 T75 T74 T73 T71 T70 T69 T68 T67 T66 T34 T33 T32 T31 T30 T28 T27 T26 T25 T24 T23 T22 T21 T20 T19 T18 T17 T16 T15 T14 T07 S99 S98 S97 S96 S95 S94 S93 S92 S91 S90 S89 S88 S87 S86 S85 S84 S83 S82 S81 S80 S79 S78 S77 S76 S75 S74 S73 S72 S71 S70 S69 S68 S67 S66 S65 S64 S63 S62 S61 S60 S59 S58 S57 S56 S55 S54 S53 S52 S51 S50 S49 S48 S47 S46 S45 S44 S43 S42 S41 S40 S39 S38 S37 S36 S35 S34 S33 S32 S31 S30 S29 S28 S27 S26 S25 S24 S23 S22 S21 S20 S19 S17 S16 S15 S14 S13 S12 S11 S10 S09 S08 S07 S06 S05 S04 S03 S02 S01 S00	INJ001 INJ002 INJ003 INJ004 INJ005 INJ006 INJ007 INJ008 INJ009 INJ010 INJ011 INJ012 INJ013 INJ014 INJ015 INJ016 INJ017 INJ018 INJ019 INJ020 INJ021 INJ024 INJ025 INJ026 INJ027 INJ032 INJ038 INJ039 INJ040 INJ041 INJ042 INJ043 INJ044 INJ045 INJ046 INJ047 INJ048 INJ049 INJ050 INJ051 INJ052 INJ053 INJ054 INJ055 INJ056 INJ057 INJ058 INJ061 INJ062 INJ063 INJ064 INJ068 INJ073 INJ074
Heart Disease	096 097 100 101 102 103 104 105 106 107 108	I09 I11 I13 I20 I21 I22 I23 I24 I25 I26 I27 I28 I44 I45 I46 I47 I48 I49 I50 I51 I52 I97 I30 I31 I32 I34 I35 I36 I37 I38 I39 I40 I41 I42 I43	CIR001 CIR002 CIR003 CIR004 CIR005 CIR006 CIR010 CIR011 CIR012 CIR014 CIR015 CIR016 CIR017 CIR018 CIR019
Rheumatoid Arthritis	202	M05 M06 M45	MUS003
Asthma	128	J45	RSP009
Chronic Kidney Disease	158	N18	GEN003
COPD	127	J40 J41 J42 J43 J44 J47	RSP008

Our analyses were limited to adults with 12 months of private insurance, ages 18 to 64 years old. Any respondent with a missing survey weight or missing values in any of the model covariates were excluded resulting in an analytic sample of 92,792.

DISCUSSION

We used generalized linear model (GLM) with gamma distribution and log-link function to predict three types of annual expenditures (total amount for all health care utilization, total amount paid by private insurance, and total out-of-pocket) in three time periods: 2010 – 2013, 2014 – 2017, and 2018 – 2020. We then estimated counterfactuals for the latter two time periods by calculating predicted spending using the characteristics of the 2010 – 2013 patients with the regression coefficients for each of the respective latter two time periods.

In each of our models, we controlled for patient characteristics, including age, sex, race/ethnicity, education, region, health status, income level, smoking, and total number of treated conditions.

We used Stata, version 17.0, for data analysis [3]. Sample weights and survey estimation commands were used to adjust for the complex survey design of MEPS. All spending amounts are presented in 2020 dollars, using the GDP implicit price deflator [4].

FINDINGS

Table 1 presents 10-year trends in average private insurance and out-of-pocket spending, as well as trends in chronic disease prevalence between 2010 and 2020. Real per insured private insurance spending increased from \$3,540 in 2010 to \$4,967 by

2020, an average annual increase of 3.4 percent. These results may have been impacted by the COVID-19 pandemic. The Centers for Medicare and Medicaid Services (CMS) reported that private health spending declined by 1.2 percent in 2020 [5]. However, CMS reports that the decline was largely due to a reduction in private insurance enrollment. We report average annual increases per insured and the results are virtually identical. The average increase between 2000 and 2009 was 3.47 percent and between 2000 and 2010 was 3.45 percent. We also did the analysis dropping the year 2020 using 2018-2019 as the third time period. The regression results were virtually identical to the results reported here.

The average annual increase in spending between 2000 and 2009 Out-of-pocket spending among privately insured adult increased from \$703 in 2010 to \$897 by 2020, an average annual increase of 2.5 percent.

Trends in the prevalence of chronic disease among privately insured adults were relatively stable over time. Fifty two percent adults had no treated chronic conditions in 2010 compared to 57 percent by 2020. The percent of adults with 3 or more chronic conditions treated decreased slightly over time, falling from 9.4 percent in 2010 to 7 percent in 2020.

Trends in chronic disease prevalence were generally stable over time as well. Diabetes prevalence remained around 6.2 percent from 2010 through 2020. Hypertension prevalence showed a slight decline from 18.5 to 15.3 percent. The remaining chronic conditions examined were virtually constant over time.

Table 2 examines changes in real per insured spending by

Table 1: Averages Among Those with Private Health Insurance, Age 18-64, 2010-2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Real Private Spending	\$3,540	\$4,193	\$3,659	\$3,463	\$3,639	\$4,119	\$3,678	\$4,049	\$4,901	\$4,813	\$4,967
Real Out of Pocket	\$830	\$823	\$751	\$795	\$709	\$791	\$811	\$789	\$984	\$993	\$897
Total Chronic Conditions											
0	52.0%	51.6%	54.8%	54.3%	53.7%	53.1%	56.9%	57.9%	57.4%	57.2%	56.8%
1	26.2%	26.5%	25.3%	25.3%	26.6%	25.1%	25.5%	24.7%	24.3%	25.3%	25.0%
2	12.5%	12.1%	10.8%	11.6%	11.1%	12.3%	10.1%	10.3%	11.0%	10.9%	11.2%
3	6.1%	6.3%	5.9%	5.4%	5.5%	5.4%	4.8%	4.7%	4.8%	4.3%	4.8%
4+	3.3%	3.5%	3.1%	3.5%	3.1%	4.0%	2.7%	2.3%	2.5%	2.3%	2.2%
Treated Prevalence											
Diabetes	6.2%	6.8%	6.1%	6.6%	6.1%	6.8%	6.2%	6.1%	5.9%	5.8%	6.2%
Kidney Disease	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.1%
Hypertension	18.5%	18.5%	17.3%	17.4%	16.9%	17.7%	16.8%	16.3%	16.5%	15.7%	15.3%
Hyperlipidemia	15.2%	14.7%	14.1%	14.0%	13.1%	13.4%	12.7%	11.7%	11.5%	10.9%	11.2%
COPD	3.3%	3.2%	2.5%	2.9%	2.5%	3.0%	3.1%	2.8%	0.7%	0.6%	0.6%
arthritis	0.9%	1.0%	1.0%	0.8%	1.0%	1.0%	0.0%	1.0%	1.0%	0.8%	0.8%
Asthma	4.3%	4.1%	4.1%	4.2%	4.1%	4.5%	3.8%	3.9%	5.1%	4.8%	4.7%
Depression	8.0%	8.0%	7.3%	7.9%	7.5%	7.6%	6.7%	6.2%	6.9%	7.5%	8.1%
Heart Disease	5.1%	5.2%	4.4%	4.6%	4.4%	4.8%	3.1%	2.5%	3.4%	3.3%	2.9%
Trauma	12.3%	12.1%	11.3%	11.3%	11.4%	12.6%	9.4%	9.2%	9.0%	8.6%	8.8%
Mental Disorders	13.8%	14.6%	13.8%	14.3%	15.5%	15.4%	14.9%	14.1%	15.5%	15.9%	17.8%
Cancer	4.2%	4.7%	3.7%	3.9%	4.4%	4.6%	2.2%	1.9%	3.1%	3.2%	2.9%

Source: Tabulations from MEPS-HC, 2010-2020

Table 2: Mean Real Private Health Insurance Spending per Capital by Medical Conditions, 2010-2013, 2018-2020

	2010-2013	2018-2020	% Change
Diabetes	\$ 2,380	\$ 4,875	104.8%
Hypertension	\$ 546.	\$ 459.	-16%
Hyperlipidemia	\$735.	\$371.	-49.5%
Mental Disorders	\$1,400	\$1,786	23.3%
Heart Disease	\$6,997	\$8,960	28.1%
Cancer	\$2,423	\$3,023	24.8%
Total	\$3,716	\$4,893	31.7%

Source: Tabulations from MEPS-HC, 2010-2020

the most expensive and prevalent chronic conditions. Between 2010 and 2020 private insurance spending per adult rose from \$3,716 to \$4,893 a 31.7 percent increase. The 2020 spending level however was most likely impacted by COVID. The pattern of spending changes varied widely across chronic condition. Per insured spending on hyperlipidemia declined nearly 50 percent per person over the ten-year period, falling from \$735 to \$371. This decline reflects a dramatic change in the mix of statins with a large rise in the use of generic statins and a 90 percent reduction over a ten-year period for brand name statins [6]. Similarly, increased use of generic drugs to treat hypertension (generic Lipitor) rose over the ten-year period resulting in 16 percent decrease in spending.

In contrast, spending on other chronic conditions increased sharply. Spending to treat diabetes more than doubled, rising from \$2,380 in 2010 to \$4,875 by 2020. Cancer spending showed the next largest rise, from \$6,997 in 2010 to \$8,960 by 2020, over a 28 percent increase. Spending on trauma cases and mental disorders increased by roughly the same amount 25 and 23 percent respectfully over the ten-year period.

Table 3 presents the full regression results for private insurance spending focusing on the number of chronic conditions treated. We focus on the results from 2010-2013 and 2018-2020 through the 2014-2017 results are reported as well. In both periods, women incurred higher expenses (about \$2,000) than men. Self-reported health status also impacted spending, private insurance spending for those that reported poor health were over \$15,000 higher compared to those reporting excellent health (results similar in both periods).

Private insurance spending was considerably lower for racial and ethnic minorities. In 2010-2013 and 2018-2020 spending was approximately \$900 lower for Non-Hispanic other adults compared to Non-Hispanic White adults. Insurance spending was \$713 lower in 2010-2013 and \$619 lower in 2018-2020 for Non-Hispanic Black adults compared to Non-Hispanic White adults. Finally, spending on Hispanic adults was over \$500 lower in the earlier period, and \$213 lower in the latter period compared to non-Hispanic White adults.

In both time periods, higher levels of education were associated with higher private insurance spending. In the 2018-2020 time period, adults with a college degree spending \$2,700 more than adults with no degree.

Somewhat surprisingly smokers incurred lower health care spending in both periods, ranging from \$700 to over \$840 lower per year.

Finally, even when controlling for self-reported health status, the number of chronic conditions treated has a substantial impact on private insurance spending.

The incremental spending for each additional condition was about \$2,000 in 2010-2013 and was similar in 2018-2020. The major difference was the incremental spending associated with moving from 3 to 4 or more conditions treated in 2018-2020. In this case, the additional spending was over \$4,200 higher ($p < .10$).

Table 4 presents the same set of results for out-of-pocket spending trends over time. Like total spending, females spent approximately \$380 more out of pocket compared to males in both time periods. Reported health status also influenced spending as those reporting in poor health spent \$1,000 to \$1,200 more out-of-pocket in the two time periods. Racial minorities spent less out-of-pocket compared to non-Hispanic White adults. In the latest period, out-of-pocket spending was approximately \$350 to \$419 lower per year for racial and ethnic minorities.

Out-of-pocket was over \$200 higher for adults aged 50 to 64 compared to those under 50. Out-of-pocket spending also increased with higher levels of education. Adults with a college degree spent \$340 to \$400 more per year out-of-pocket compared to those without a high school diploma. As before smokers spend less out-of-pocket (\$120 to \$160) compared to non-smokers.

As before, even accounting for self-reported health status, out-of-pocket spending increased sharply with the number of chronic conditions treated. In both time periods examined, out-of-pocket spending was \$1,200 to nearly \$1,300 more per year for those with 4 or more conditions compared to those with no chronic conditions.

Out-of-pocket spending for those with one chronic condition was higher in 2018-2020 (\$212, $p < .05$) compared to 2010-2013. Out-of-pocket spending for other chronically ill patients were similar in the two time periods.

The results in Table 5 estimates the marginal impact of race and ethnicity and the most expensive and prevalent chronic conditions on private insurance spending in two time periods (2010-2013 and 2018 and 2020) as well as over the two periods. Other demographic results were similar in these models that were reported above and therefore are not shown.

In both time periods, health spending was approximately \$2,000 higher for females. Spending on racial and ethnic minorities in the 2010-2013 time period were uniformly lower compared to non-Hispanic White adults. This ranged from \$508 per year lower for Hispanic Adults to over \$900 per year for non-Hispanic other adults.

Spending increased sharply with the number of chronic conditions treated. In 2010-2013 incremental spending was

Table 3: Table presents the full regression results for private insurance spending focusing on the number of chronic conditions treated.

Real (2020\$) Total Private Health Expenditures marginal effects, 18-64, 2010-2013

Average marginal effects
 Number of strata = 660 Number of obs = 40,057
 Number of PSUs = 1,453 Population size = 41,127,025
 Subpop. no. obs = 36,537

Linearized						
dy/dx std. err.t P> t [95% conf. interval]						

1.female	1995.323	163.5247	12.20	0.000	1674.331	2316.315
hlthstat						
very_good	713.9643	156.4876	4.56	0.000	406.7854	1021.143
good	1888.794	188.5281	10.02	0.000	1518.721	2258.867
fair	5425.748	482.1349	11.25	0.000	4479.336	6372.159
poor	15240.91	2080.745	7.32	0.000	11156.5	19325.33
racethx						
Hisp	-508.158	249.1425	-2.04	0.042	-997.2149	-19.10123
NHblack	-713.4314	214.595	-3.32	0.001	-1134.673	-292.19
NHother	-906.8461	199.5752	-4.54	0.000	-1298.604	-515.088
agegrp						
35-49	-188.8206	224.927	-0.84	0.401	-630.3433	252.7021
50-64	455.5581	259.2237	1.76	0.079	-53.28777	964.4039
povcat						
100-199%	73.18823	330.0251	0.22	0.825	-574.6378	721.0143
200-399%	526.6362	316.809	1.66	0.097	-95.24728	1148.52
400%+	1090.472	316.4289	3.45	0.001	469.3346	1711.609
region						
Midwest	454.8001	316.2648	1.44	0.151	-166.0151	1075.615
South	-614.3952	210.0326	-2.93	0.004	-1026.681	-202.1096
West	-239.53	222.9592	-1.07	0.283	-677.19	198.13
educgrp						
HSgrad	420.7144	280.017	1.50	0.133	-128.9478	970.3765
SomeColl_Assc	505.604	269.37	1.88	0.061	-23.15861	1034.367
CollegeGrad	1468.191	310.1386	4.73	0.000	859.4016	2076.981
1.smoker	-706.1203	174.4024	-4.05	0.000	-1048.465	-363.7755
totcond						
1_cond	1983.512	132.2196	15.00	0.000	1723.97	2243.054
2_cond	3616.264	318.1501	11.37	0.000	2991.748	4240.78
3_cond	5432.958	394.8348	13.76	0.000	4657.913	6208.003
4+_cond	7658.692	661.9313	11.57	0.000	6359.347	8958.036
year						
2011	627.3848	259.531	2.42	0.016	117.9358	1136.834
2012	-8.824805	236.4594	-0.04	0.970	-472.9851	455.3355
2013	90.87363	239.4017	0.38	0.704	-379.0622	560.8095

Note: dy/dx for factor levels is the discrete change from the base level.						
Real (2020\$) Total Private Health Expenditures marginal effects, 18-64, 2014-2017						
Average marginal effects						
Number of strata = 777 Number of obs = 39,737						
Number of PSUs = 1,707 Population size = 43,554,880						
Subpop. no. obs = 34,682						

Linearized						
dy/dx std. err.t P> t [95% conf. interval]						

1.female	2165.076	173.0497	12.51	0.000	1825.463	2504.69
hlthstat						
very_good	794.3375	147.2209	5.40	0.000	505.4139	1083.261
good	2010.295	229.5375	8.76	0.000	1559.823	2460.766
fair	5043.033	574.1181	8.78	0.000	3916.316	6169.75
poor	14666.6	1913.458	7.66	0.000	10911.4	18421.79
racethx						
Hisp	-796.2888	244	-3.26	0.001	-1275.143	-317.4345
NHblack	-604.8304	259.1208	-2.33	0.020	-1113.36	-96.30126
NHother	-1023.483	200.2227	-5.11	0.000	-1416.424	630.5428
agegrp						
35-49	247.5002	178.032	1.39	0.165	-101.8909	596.8913
50-64	1274.193	255.6759	4.98	0.000	772.4242	1775.961
povcat						
100-199%	-271.5139	454.0502	-0.60	0.550	-1162.596	619.5678
200-399%	-98.47073	401.0757	-0.25	0.806	-885.589	688.6476
400%+	416.9051	405.7081	1.03	0.304	-379.3044	1213.115
region						
Midwest	-485.5313	333.797	-1.45	0.146	-1140.614	169.5512
South	-869.167	310.1232	-2.80	0.005	-1477.789	-260.5447
West	-432.5776	345.8752	-1.25	0.211	-1111.364	246.2086
educgrp						
HSgrad	-455.5441	551.1518	-0.83	0.409	-1537.19	626.1014
SomeColl_Assc	172.2469	557.8743	0.31	0.758	-922.5915	1267.085
CollegeGrad	693.4086	551.8777	1.26	0.209	-389.6613	1776.479
1.smoker	-582.2257	288.375	-2.02	0.044	-1148.167	-16.28452
totcond						
1_cond	2486.605	178.8397	13.90	0.000	2135.629	2837.582
2_cond	3739.015	265.0399	14.11	0.000	3218.87	4259.161
3_cond	6291.239	685.5033	9.18	0.000	4945.926	7636.552
4+_cond	8241.567	712.9657	11.56	0.000	6842.359	9640.775
year						
2015	375.2862	249.7817	1.50	0.133	-114.9149	865.4873
2016	455.5463	238.9579	1.91	0.057	-13.41283	924.5055
2017	713.6976	248.0098	2.88	0.004	226.9738	1200.421

Note: dy/dx for factor levels is the discrete change from the base level.						
Real (2020\$) Total Private Health Expenditures marginal effects, 18-64, 2018-2020						
Average marginal effects						
Number of strata = 327 Number of obs = 27,761						
Number of PSUs = 819 Population size = 33,951,518						
Subpop. no. obs = 21,573						

Linearized						
dy/dx std. err.t P> t [95% conf. interval]						

1.female	2763.811	284.646	9.71	0.000	2204.54	3323.083
hlthstat						
very_good	1034.082	269.8887	3.83	0.000	503.8049	1564.358
good	2867.27	392.3505	7.31	0.000	2096.381	3638.159

fair		7223.667	919.114	7.86	0.000	5417.794	9029.54
poor		15233.89	3367.076	4.52	0.000	8618.269	21849.51
racethx							
Hispanic		-212.4884	562.0939	-0.38	0.706	-1316.889	891.9122
NHblack		-618.7154	461.5657	-1.34	0.181	-1525.598	288.1677
NHother		-904.8463	448.3638	-2.02	0.044	-1785.79	-23.90238
agegrp							
35-49		-106.0655	332.6506	-0.32	0.750	-759.6566	547.5256
50-64		814.3191	368.462	2.21	0.028	90.36588	1538.272
povcat							
100-199%		-314.4493	721.2378	-0.44	0.663	-1731.535	1102.637
200-399%		373.2461	680.8165	0.55	0.584	-964.4203	1710.913
400%+		793.0822	636.4753	1.25	0.213	-457.4629	2043.627
region							
Midwest		294.5676	422.8243	0.70	0.486	-536.1965	1125.332
South		-644.9031	378.3514	-1.70	0.089	-1388.287	98.48075
West		359.4798	466.2679	0.77	0.441	-556.6422	1275.602
educgrp							
HSgrad		1517.109	418.6445	3.62	0.000	694.5571	2339.66
SomeColl_Assc		2270.551	433.8592	5.23	0.000	1418.106	3122.997
CollegeGrad		2700.16	388.3434	6.95	0.000	1937.144	3463.176
1.smoker		-706.1203	174.4024	-4.05	0.000	-1048.465	-363.7755
totcond							
1_cond		3175.667	285.5913	11.12	0.000	2614.538	3736.796
2_cond		5330.35	481.0331	11.08	0.000	4385.218	6275.483
3_cond		7950.541	865.8371	9.18	0.000	6249.346	9651.735
4+_cond		12197.02	1595.543	7.64	0.000	9062.099	15331.94
year							
2019		-205.8972	284.0164	-0.72	0.469	-763.9319	352.1374
2020		-343.1541	352.6807	-0.97	0.331	-1036.1	349.792

Note: dy/dx for factor levels is the discrete change from the base level.							

NHother		-171.8883	47.62473	-3.61	0.000	-265.3737	-78.40284
agegrp							
35-49		-188.8206224	927.084	0.401	-630.3433252	7021.22	22.598
28.30305		0.80	0.425	-32.9597678	15575		
50-64		455.5581	259.2237	1.76	0.079	-53.28777964	4039
262.5501		34.33086	7.65	0.000	195.16329	9402	
povcat							
100-199%		175.9181	79.20286	-2.22	0.027	-331.3901	-20.44604
200-399%		-75.09815	76.81253	-0.98	0.329	-225.878175	68177
400%+		35.10354	77.28725	0.45	0.650	-116.6082186	8153
region							
Midwest		196.8679	31.58485	6.23	0.000	134.8681258	8677
South		146.7547	34.18499	4.29	0.000	79.65089213	8584
West		238.5506	39.18327	6.09	0.000	161.6354315	4658
educgrp							
HSgrad		35.13912	38.89257	0.90	0.367	-41.20543111	4837
SomeColl_Assc		152.8567	35.29145	4.33	0.000	83.58104222	1324
CollegeGrad		338.6766	38.36374	8.83	0.000	263.3701413	9831
1.smoker		373.686623	342916.01	0.000	327.8654	419.5077	
totcond							
1_cond		415.2717	23.75265	17.48	0.000	368.6463461	8972
2_cond		773.8486	44.10294	17.55	0.000	687.2763860	4209
3_cond		946.4466	50.92685	18.58	0.000	846.47931046	414
4+_cond		1293.191	85.96375	15.04	0.000	1124.4481461	935
year							
2011		627.3848259	531.242	0.016	117.93581136	834.6725614	
33.23019		0.20	0.840	-58.5039271	95514		
2012		-8.824805	236.4594	-0.04	0.970	-472.9851455	3355
2013		90.87363	239.4017	0.38	0.704	-379.0622560	8095
-20.46487		35.06566	-0.58	0.560	-89.2973648	36761	

Note: dy/dx for factor levels is the discrete change from the base level.							

Real (2020\$) Total out-of-pocket spending marginal effects, 18-64, 2014-2017

Average marginal effects
 Number of strata = 777 Number of obs = 39,737
 Number of PSUs = 1,707 Population size = 43,554,880
 Subpop. no. obs = 34,682

 | Linearized
 | dy/dx std. err. tP>|t| [95% conf. interval]

1.female | 353.6019 25.19495 14.03 0.000 304.1563403 0.0474

hlthstat							
very_good		87.16979	30.03582	2.90	0.004	28.22395146	1156
good		163.1072	34.02968	4.79	0.000	96.32337229	8911
fair		516.5662	66.59355	7.76	0.000	385.8751647	2572
poor		783.4051	170.7659	4.59	0.000	448.2741118	536

racethx							
Hispanic		-282.2319	34.66339	-8.14	0.000	-350.2594	-214.2043
NHblack		-367.6007	30.27213	-12.14	0.000	-427.0103	-308.1911
NHother		-321.3087	30.96833	-10.38	0.000	-382.0846	-260.5328
agegrp							

Table 4: Table presents the same set of results for out-of-pocket spending trends over time
Real (2020\$) Total out-of-pocket spending marginal effects, 18-64, 2010-2013

Average marginal effects
 Number of strata = 660 Number of obs = 40,057
 Number of PSUs = 1,453 Population size = 41,127,025
 Subpop. no. obs = 36,537

 | Linearized
 | dy/dx std. err. tP>|t| [95% conf. interval]

1.female | 373.686623 342916.01 0.000 327.8654 419.5077

hlthstat							
very_good		76.86804	25.31669	3.04	0.002	27.17239126	5637
good		217.1564	35.60013	6.10	0.000	147.2747	287.038
fair		574.4637	68.27431	8.41	0.000	440.444708	4834
poor		1214.077	178.1707	6.81	0.000	864.3351156	819

racethx							
Hispanic		-291.2019	27.56302	-10.56	0.000	-345.307	-237.0968
NHblack		-391.8161	25.75718	-15.21	0.000	-442.3765	-341.2558

35-49 | -188.8206224.927-0.84 0.401-630.3433 52.7021 38.62786
 30.06198 1.28 0.199-20.3693197.62503
 50-64 | 455.5581 259.2237 1.76 0.079-53.287774.4039 201.4485
 30.81292 6.54 0.000 140.9776261.9194
povcat |
 100-199% | -76.40574 63.93363-1.20 0.232-201.876649.06516
 200-399% | 26.11468 61.71868 0.42 0.672-95.00935147.2387
 400%+ | 231.7134 61.12645 3.79 0.000 111.7517351.6752
region |
 Midwest | 109.5119 41.26408 2.65 0.008 28.53035190.4934
 South | 37.97976 39.93753 0.95 0.342-40.39836116.3579
 West | 110.9818 42.98803 2.58 0.010 26.61703195.3466
educgrp |
 HSgrad | -72.68969 91.82671-0.79 0.429-252.9013107.5219
 SomeColl_Assc | -6659862 93.48409-0.01 0.994-
 184.1302182.7982
 CollegeGrad | 230.8402 94.17284 2.45 0.014 46.02427415.6561
 1.smoker | -706.1203 174.4024-4.05 0.000-1048.465 -363.7755
 41.26408 2.65 0.008 28.53035190.4934
totcond |
 1_cond | 452.5405 27.8581716.24 0.000 397.8683507.2126
 2_cond | 644.4768 34.5252418.67 0.000 576.7204712.2333
 3_cond | 1056.148 67.5447615.64 0.000 923.59051188.706
 4+_cond | 1184.645 78.2169215.15 0.000 1031.1431338.147
year |
 2015 | 627.3848259.531 2.42 0.016 117.93581136.834
 33.23019 0.20 0.840-58.5039271.95514
 2016 | -8.824805 236.4594-0.04 0.970-472.9851455.3355
 2017 | 90.87363 239.4017 0.38 0.704-379.0622560.8095
 35.06566-0.58 0.560-89.2973648.36761

Note: dy/dx for factor levels is the discrete change from the base level.

Real (2020\$) Total out-of-pocket spending marginal effects, 18-64, 2018-2020

Average marginal effects
 Number of strata = 327 Number of obs = 27,761
 Number of PSUs = 819 Population size = 33,951,518
 Subpop. no. obs = 21,573

| Linearized
 | dy/dx std. err. tP>|t| [95% conf. interval]

1.female | 385.9663 42.42095 9.10 0.000 302.6177469.3148
hlthstat |
 very_good | 118.9276 42.41185 2.80 0.005 35.59689202.2583
 good | 313.2483 62.04145 5.05 0.000 191.3495435.1472
 fair | 719.5106132.062 5.45 0.000 460.0355978.9857
 poor | 1071.651 269.8622 3.97 0.000 541.42611601.875
racethx |
 Hisp | -347.0093 45.61811-7.61 0.000-436.6397-257.379
 NHblack | -418.7708 80.21721-5.22 0.000-576.3814 -261.1603
 NHother | -355.9838 58.22933-6.11 0.000-470.3927-241.575
agegrp |
 35-49 | -188.8206224.927-0.84 0.401-630.3433252.7021 -3.611623
 51.87324-0.07 0.945 -105.53298.30879

50-64 | 455.5581 259.2237 1.76 0.079-53.2877764.4039
povcat |
 100-199% | 107.4156109.222 0.98 0.326-107.1835322.0147
 200-399% | 135.055 92.21461 1.46 0.144-46.12805 316.238
 400%+ | 339.5286 91.83284 3.70 0.000 159.0956519.9615
region |
 Midwest | 110.2337 60.56904 1.82 0.069-8.772207229.2396
 South | 23.35172 62.21167 0.38 0.708 -98.8816 145.585
 West | 19.37645 57.57367 0.34 0.737-93.74414 132.497
educgrp |
 HSgrad | -17.13086 75.19877-0.23 0.820-164.8812130.6195
 SomeColl_Assc | 170.0514 77.38554 2.20 0.028 18.00452322.0983
 CollegeGrad | 400.1915 82.03416 4.88 0.000 239.011 561.372
 1.smoker | -161.2051 49.75993-3.24 0.001-258.9733 -63.43694
 1_cond | 627.0462 44.7784214.00 0.000 539.0657715.0268
 2_cond | 769.5137 67.1870911.45 0.000 637.5046901.5227
 3_cond | 1175.277 115.718810.16 0.000 947.91321402.641
 4+_cond | 1235.621 123.425810.01 0.000 993.11421478.128
year |
 2019 | -12.07607 46.67606-0.26 0.796-103.785179.63294
 2020 | -117.8587 51.86508-2.27 0.023 -219.763 -15.95429

 Note: dy/dx for factor levels is the discrete change from the base level.

Table 5: Marginal Effects on Private Health Insurance Spending by Numbers of Chronic Conditions 2010-2013, 2018-2020

Variable	2010-2013	2018-2020
Female	\$1,995*	\$ 2,764*
Relative to Non-Hispanic White		
Hispanic	-\$508*	- \$212*
Non-Hispanic Black	- \$713*	-\$619*
Non-Hispanic Other	-\$907*	-\$905*
Number of Chronic Conditions		
1	\$1,983*	√ \$3,175*
2	\$3,616*	√ \$ 5,330*
3	\$5,432*	√ \$ 7,950*
4+	\$7,659*	√ \$12,197*

Source: Analysis from MEPS-HC
 *Significant different from Fewer conditions p< .05 (4 vs 3, 3 vs. 2, 2 vs. 1)
 √Significant different p< .05 across the two time periods.

Table 6: Marginal Effects on Out-Of-Pocket Health Insurance Spending, By Number of Chronic Conditions, 2010-2013, 2018-2022

Variable	2010-2013	2018-2020
Female	\$374*	\$ 385*
Relative to Non-Hispanic White		
Hispanic	-\$291*	- \$347*
Non-Hispanic Black	- \$392*	-\$419*
Non-Hispanic Other	-\$172*	-\$356*
Number of Chronic Conditions		
1	\$415*	√ \$627*
2	\$774*	\$ 770*
3	\$946*	\$ 1,175*
4+	\$1,293*	\$1,235*

Source: Analysis from MEPS-HC
 *Significant different from Fewer conditions p< .05 (4 vs 3, 3 vs. 2, 2 vs. 1)
 √Significant different p< .05 across the two time periods.

Table 7: Fully Interacted Model Impact of Key Chronic Disease on Level 1 Private Insurance Spending, 2010-2020.

Conditions	(2014-2017 vs 2010-2013)	(2010-2013 vs 2018-2020)
Heart Disease	\$2,592*	\$3,417*
Trauma	\$630	\$1,300*
Cancer	\$417	\$4,282*
Mental Disease	\$190	\$965*
COPD/Asthma	\$502	\$510

Source: Analysis from MEPS-HC Significantly different from zero, $p < .05$

Table 8: Fully Interacted Model Impact of Key Chronic Conditions on Out-of-Pocket Spending Privately Insurance Audits, 2010-2020

Conditions	(2014-2017 vs 2010-2013)	(2010-2013 vs 2018-2020)
Heart Disease	-\$75	\$102
Trauma	\$67	\$201*
Cancer	\$7	\$180
Mental Disease	\$8	\$280*
COPD/Asthma	-\$65	-\$61

Source: Analysis from MEPS-HC Significantly different from zero, $p < .05$

\$1,983 higher and those with 4 or more conditions \$7,659 higher for those with 4 or more conditions compared to those with no chronic conditions. Spending on chronic disease increased sharply over the ten-year period. Private insurance spending for each category of the number of chronic conditions increased by nearly \$1,200 (for those with one condition) to over \$4,500 more in 2018-2020 for those with 4 or more conditions. These changes within each category were all statistically significant ($p < .05$).

The results presented in Table 6 estimate the incremental out-of-pocket expenditures by race and ethnicity and number of chronic conditions treated. Out-of-pocket spending increased sharply as the number of chronic conditions treated increased. Relative to adults with no chronic conditions, out-of-pocket spending was \$415 higher for those with 1 condition rising to nearly \$1,300 higher for those with 4 or more conditions treated. As before, out-of-pocket spending for racial and ethnic minorities were lower than from Non-Hispanic White adults.

Out-of-pocket spending rose over the two time periods for adults with one chronic condition ($p < .05$). For these adults, spending was \$212 higher in 2018-2020 compared to 2010-2013.

We next estimate the change in private insurance spending for five of the most expensive chronic conditions over time. Using a Wald Chi-Square test we compare the impact of changes in chronic care spending on total private insurance spending (Table 7), and out-of-pocket spending (Table 8), for three time periods; 2014-2017 and 2010-2013 and 2018-2020 and 2010-2013.

Spending for four of the five chronic conditions examined increased significantly between 2018-2020 and 2010-2013. Cancer spending was \$4,282 higher in the latter period compared to the earlier period. Similarly spending to treat heart disease was \$3,417 higher, trauma spending \$1,300 and treatment of mental disorders \$965 higher in 2018-2020 compared to 2010-2013. Spending to treat heart disease was also higher (\$2,592) in 2014-2017 compared to 2010-2013.

Out-of-pocket spending to treat two chronic conditions also increased over time (Table 8). Spending to treat trauma patients was \$201 higher in 2018-2020 compared to 2010-2013. Out-of-pocket spending for patients treated for mental disorders was \$280 in 2018-2020 compared to 2010-2013.

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

Real per capita private insurance spending increased an average of 3.4 percent per year between 2010 and 2020. Out-of-pocket spending also increased over this period but by a lower amount of 2.5 percent per year. The analysis highlights several important demographic differences in the level of both total insurance spending and out-of-pocket spending over this period. First, health care spending, even controlling for reported health status and chronic health conditions, were lower for racial and ethnic minorities compared to non-Hispanic White adults. Out-of-pocket spending was also lower for racial and ethnic minorities. These differences however have not increased over the ten-year period examined. The result also show that spending rises with educational attainment and age. Total and out-of-pocket spending was also higher for women.

As may be expected the most important determinants of total and out-of-pocket were self-reported health status and the number of chronic health care conditions treated. Total spending on those with self-reported poor health was over \$15,000 higher compared to those reporting excellent health. The significantly higher spending among those with fair or poor health compared to patients with excellent health was observed even when controlling for the number of chronic health care conditions treated.

The analysis also highlighted the substantial increase in total and out-of-pocket spending among patients a greater number of chronic conditions treated. Private insurance spending for adults under treatment for 4 or more chronic conditions were over \$12,000 higher compared to adults with no chronic conditions treated. Even among chronically ill adults, spending increased substantially for each additional chronic condition treated. A similar result was found for out-of-pocket spending for chronically ill adults. These high levels of out-of-pocket spending for chronically ill patients are a concern if they deter patients from adhering to medications and seeking timely treatment. One approach would be to lower or eliminate cost sharing on clinically important medications used to treat patients with highly prevalent chronic conditions.

The analysis highlights several areas of interest. The lower spending overall on racial minorities even after accounting for health status raises some issues that require additional study. The analysis also highlighted that higher spending on several chronic conditions were an important factor accounting for the growth in total private insurance spending. Additional treatment costs of cancer and heart disease were the two leading conditions accounting for the increased spending. The increased spending

was not associated with higher prevalence of the conditions, they were relatively stable over the ten-year period. Higher treatment costs per case then accounted for the rise.

The analysis showed that the treatment costs of some conditions like hyperlipidemia and hypertension actually declined over time. The lower level of spending is linked to the increased use of generic medications to treat both conditions.

Finally, the results provide important information for capitated health insurance plans in general (Medicare, Medicaid, and private insurance). These plans must predict forward looking treatment costs in setting premiums or negotiation per capita payments. The fact that both reported health status and the number and mix of chronic conditions (which are used in risk adjusting per capita rates for Medicare Advantage plans) are highly predictive of spending highlights the important role that health risk assessments in addition to clinical data in predicting levels of spending. Relying solely on risk adjusting simply using claims data on clinical data could result in underpredicting next year's spending levels. Both risk assessment information and the clinical data are two of the most important determinants of the level and change in health care spending.

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