

Trends in Unmet Need for Physician and Preventive Services in the United States, 1998-2017

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IMPORTANCE Improvements in insurance coverage and access to care have resulted from the Affordable Care Act (ACA). However, a focus on short-term pre- to post-ACA changes may distract attention from longer-term trends in unmet health needs, and the problems that persist.

OBJECTIVE To identify changes from 1998 to 2017 in unmet need for physician services among insured and uninsured adults aged 18 to 64 years in the United States.

DESIGN, SETTING, AND PARTICIPANTS Survey study using 20 years of data, from January 1, 1998, to December 31, 2017, from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System to identify trends in unmet need for physician and preventive services.

MAIN OUTCOMES AND MEASURES The proportion of persons unable to see a physician when needed owing to cost (in the past year), having no routine checkup for those in whom a routine checkup was likely indicated (within 2 years), or failing to receive clinically indicated preventive services (in the recommended timeframe), overall and among subgroups defined by the presence of chronic illnesses and by self-reported health status. We estimated changes over time using logistic regression controlling for age, sex, race, Census region, employment status, and income.

RESULTS Among the adults aged 18 to 64 years in 1998 (n = 117 392) and in 2017 (n = 282 378) who responded to the Centers for Disease Control and Prevention Behavioral Risk Factors Surveillance System (mean age was 39.2 [95% CI, 39.0-39.3]; 50.3% were female; 65.9% were white), uninsurance decreased by 2.1 (95% CI, 1.6-2.5) percentage points (from 16.9% to 14.8%). However, the adjusted proportion unable to see a physician owing to cost increased by 2.7 (95% CI, 2.2-3.8) percentage points overall (from 11.4% to 15.7%, unadjusted); by 5.9 (95% CI, 4.1-7.8) percentage points among the uninsured (32.9% to 39.6%, unadjusted) and 3.6 (95% CI, 3.2-4.0) percentage points among the insured (from 7.1% to 11.5%, unadjusted). The adjusted proportion of persons with chronic medical conditions who were unable to see a physician because of cost also increased for most conditions. For example, an increase in the inability to see a physician because of cost for patients with cardiovascular disease was 5.9% (95% CI, 1.7%-10.1%), for patients with elevated cholesterol was 3.5% (95% CI, 2.5%-4.5%), and for patients with binge drinking was 3.1% (95% CI, 2.3%-3.3%). The adjusted proportion of chronically ill adults receiving checkups did not change. While the adjusted share of people receiving guideline-recommended cholesterol tests (16.8% [95% CI, 16.1%-17.4%]) and flu shots (13.2% [95% CI, 12.7%-13.8%]) increased, the proportion of women receiving mammograms decreased (-6.7% [95% CI, -7.8 to -5.5]).

CONCLUSIONS AND RELEVANCE Despite coverage gains since 1998, most measures of unmet need for physician services have shown no improvement, and financial access to physician services has decreased.

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A widely cited study by Ayanian et al¹ highlighted the high prevalence of unmet health needs in 1998, particularly among the uninsured. In the subsequent 2 decades, medical costs have grown exponentially,² deductibles and copayments have escalated³; Medicaid enrollment has risen sharply⁴; accountable care organizations and pay-for-performance incentives have become commonplace⁵; many private insurers have implemented new cost containment measures and narrowed their provider networks; and, in 2014, a landmark health reform, the Affordable Care Act (ACA), was implemented.

Many analyses have documented the salutary effects of the ACA on coverage, access to care, and disparities in access.⁶⁻¹² However, such analyses may miss the longer-term trends that may affect access to care, eg, the growth of narrow networks, high-deductible plans and higher co-pays that obstruct access to physician services¹³ and may compromise health, especially for persons with low incomes.¹⁴⁻¹⁶ A longer view could help place the achievements of the ACA in the context of these longer-term changes and inform future reform efforts.

We used the same data source as in the 1998 study¹ to explore changes in unmet health care needs among adults aged 18 to 64 years in the past 2 decades.

Methods

Data Source

We analyzed data from the 1997-2017 Behavioral Risk Factor Surveillance System (BRFSS), a nationwide survey of the US civilian, noninstitutionalized populations administered by the Centers for Disease Control and Prevention (CDC) and state health departments. The survey collects data annually on health conditions, insurance coverage, access to care, use of preventive services, health behaviors, and demographic characteristics through telephone interviews with a random sample of adults. Some questions are asked annually and others biennially. As with most surveys, BRFSS response rates have decreased over time, from 73.4% in 1998 to 45.3% in 2017. Additional details on the BRFSS methods and procedures are available elsewhere.^{17,18} The Cambridge Health Alliance Internal Review Board deemed this study exempt from review and informed patient consent as the data were deidentified and publicly available.

Study Population

We included all adults aged 18 to 64 years who answered the BRFSS question about health insurance coverage. We excluded persons aged 65 and older, most of whom are covered by Medicare. For most analyses we used data from 1998 (n = 117 392) and 2017 (n = 282 378). However, for some questions that were asked only biennially, we used data from adjacent years 1997 (n = 105 886) or 2016 (n = 301 752). For simplicity, we refer to the 1997-1998 cohort as “1998” and the 2016-2017 cohort as “2017.” In addition, to analyze time trends in the intervening years for multiple outcomes, we used data from every other year from 1998 through 2017.

Key Points

Question Has unmet need for physician services shifted for US adults between 1998 and 2017?

Findings Using data from US adults aged 18 to 64 years in 1998 (n = 117 392) and in 2017 (n = 282 378) who responded to the Centers for Disease Control and Prevention Behavioral Risk Factors Surveillance System, this study found that from 1998 to 2017 the inability to see a physician because of cost increased 2.7 percentage points owing to worsening access to care among the insured. In contrast, the proportion of chronically ill adults receiving checkups did not change; results for receiving guideline-recommended preventive services were mixed.

Meaning Many US adults face substantial and increasing barriers in access to care, despite a modest improvement in insurance coverage in the past 20 years.

Study Variables

Data on demographic characteristics included age, sex, race/ethnicity, household income (adjusted for changes in the Consumer Price Index),¹⁹ census region, employment, education, and marital status. The proportion of missing data for all key variables (insurance status, age, race/ethnicity, sex, census region, employment) was less than 2 percent with the exception of income, which was missing for 16% of observations. We considered respondents to be insured if they responded “yes” to the questions, “Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service?” We examined subgroups with chronic diseases including hypertension, elevated cholesterol, cardiovascular disease, diabetes, and obesity; health-risk behaviors including binge drinking and active smoking; as well as respondents stratified by self-reported health status.

We examined several indicators of access: failure to see a physician when needed because of costs within the past 12 months; no visit to a physician for a routine checkup within the past 2 years (for those in whom a routine checkup was likely indicated); and failure to receive a guideline-indicated preventive service within the recommended time frame. These services included cholesterol checks, flu shots, and mammograms. The eAppendix in the [Supplement](#) presents variable details.

Statistical Analysis

We first analyzed the demographic characteristics of the study population, overall and stratified by insurance status. For our main analyses, we quantified changes in the 3 measures of unmet health needs (inability to see a physician owing to cost, lacking a checkup, and failure to receive recommended preventive services) between 1998 and 2017, overall and according to insurance status. All changes were estimated using multivariable logistic regression models that controlled for age, sex, race, census region, employment status, and income. To facilitate interpretation of these models, we report predicted marginal effects at representative values.²⁰

Additional analyses examine trends in inability to see a physician owing to cost for subgroups defined by race/

ethnicity, income, the presence of individual chronic diseases, behavioral health risk factors, and health status using the same modeling approach and covariates described in the preceding paragraph.

All analyses were conducted with Stata, version 15.1 (Stata-Corp LLC) statistical software, using weights provided by the BRFSS that allow extrapolation to the US population and procedures that account for the surveys' complex sample design.^{21,22}

Results

The study sample represented adults aged 18 to 64 years in 1998 (n = 117 392) and in 2017 (n = 282 378) who responded to the CDC BRFSS (mean age was 39.2 [95% CI, 39.0-39.3]; 50.3% were female; 65.9% were white). During that period, the uninsurance rate of this population fell by 2.1 percentage points (95% CI 1.6-2.5) from 16.9% to 14.8% (Table 1).

As shown in adjusted analyses in Table 2, the proportion of adults aged 18 to 64 years reporting they were unable to see a physician because of cost increased by 2.7 percentage points (95% CI, 2.2-3.8) between 1998 (11.4%) and 2017 (15.7%) (Table 1). In adjusted analyses stratified by insurance status, among the uninsured the proportion unable to see a physician increased by 5.9 (95% CI, 4.1-7.8) percentage points from 1998 (32.9%) to 2017 (39.6%) (Table 2). For those with coverage, the proportion unable to see a physician increased by 3.6 (95% CI, 3.2-4.0) percentage points (from 7.1% to 11.5%). Figure A displays the trend for this indicator for the overall population. It worsened gradually between 1998 and 2009, then rapidly for several years, before improving with the ACA's implementation but never to the level observed in 1998.

This access indicator also worsened among all racial/ethnic groups and nearly all income groups, both overall and stratified by insurance (Table 2). In 2017 the proportion of uninsured black, uninsured Hispanic, and uninsured low-income (<\$15 000 per year) individuals reporting they were unable to see a physician owing to cost was 44.3%, 37.5%, and 48.6%, respectively. Among the insured, the comparable figures were 13.7%, 14.5%, and 21.0%, respectively.

Compared with those with higher incomes, those in the lowest 3 income groups (<\$34 999 per year) saw the least change in the proportion unable to see a physician because of cost. For instance, overall, the income group with less than \$15 000 per year saw no change in this measure (-1.8 adjusted percentage points, 95% CI, -4.2 to 0.7), those in the low-income uninsured group saw no change (0.9 adjusted percentage points, 95% CI -4.0 to 5.9), and those in the low-income insured group saw an increase of 3.7 adjusted percentage points (95% CI 1.3-6.0). This contrasts with the highest income group (>\$75 000 per year), among whom this measure worsened by 2.8 adjusted percentage points (95% CI 2.3-3.2) overall, 4.9 adjusted percentage points (95% CI 0.8-9.0) among the uninsured, and 2.8 adjusted percentage points (95% CI 2.4-3.3) among the insured.

Inability to see a physician because of cost also became more frequent among most clinical risk groups, especially those

with coverage. In 2017, the proportion of persons with cardiovascular disease who were unable to afford a physician visit was 25.6%, 5.9 percentage points (95% CI 1.7-10.1) higher than in 1998. Among the uninsured, the change in this measure ranged from a nonsignificant -2.4 percentage points (95% CI, -9.8 to 4.9) for patients with diabetes to 10.4 percentage points (95% CI, -2.5 to 23.4) for those with cardiovascular disease; the comparable increases among the insured ranged from 3.8 percentage points (95% CI, 2.8-4.8) among respondents with hypertension to 6.9 percentage points (95% CI, 3.0-10.8) among those with cardiovascular disease.

Similarly, the proportion reporting they were unable to see a physician owing to cost worsened in each health status category but especially for those in poor health, increasing from 29.4% in 1998 to 35.9% in 2017 a change of 3.6 percentage points (95% CI, 0.4-6.9).

Table 3 shows adjusted changes between 1998 and 2017 in the proportion of respondents who had not had a checkup in the past 2 years by clinical risk group. For most clinical risk groups, we observed no change. Among those with any chronic disease, overall there was no change. However among those without insurance, we observed a 5.2 percentage point (95% CI, 2.0-8.4) decrease (improvement) in those who had not had a checkup in the previous 2 years. This measure also improved slightly among those with insurance, with a 1.1 percentage point (95% CI, 0.1-1.9) decrease. However, this measure worsened for all participants reporting poor health, a 3.7 adjusted percentage point increase overall (95% CI 1.3-6.2), with a 5.4 percentage point increase among the uninsured in poor health (95% CI 4.8-19.7), and 7.1 percentage point increase among the insured in poor health (95% CI 1.2-5.7). Figure B displays the year-by-year prevalence of this indicator. This measure increased with the increase of uninsurance and then, as insurance coverage improved, decreased back to the level observed 20 years earlier.

Table 4 shows the adjusted proportion of respondents who failed to receive guideline-recommended preventive services, including cholesterol checks, flu shots, and mammograms. For the first 2 measures, fewer respondents reported not receiving appropriate preventive services in 2017 than in 1998, both overall and among the uninsured and insured populations. Figure C displays the every-other-year trend for not having received a cholesterol check, which decreased steadily throughout the study period. However, rates of failing to receive mammography screening increased by 6.7 percentage points (95% CI, 5.5-7.8) for the overall group, as well as for both in the insured and the uninsured. Figure D displays the time trend for this indicator. The measure increases consistently throughout the study period, with a relative plateau in 2012.

Discussion

Despite short-term gains owing to the ACA, over the past 20 years the proportion of adults aged 18 to 64 years unable to see a physician owing to cost increased, mostly because of an increase among persons with insurance. In 2017, nearly one-fifth of individuals with any chronic condition (diabetes,

Table 1. Changes in the Unadjusted Proportion of Uninsured US Adults Aged 18 to 64 Between 1997 and 2017 by Demographic and Clinical Characteristics

Characteristic	1998			2017			P Value
	Estimated Population, Thousands (n = 117 392)	% Insured (n = 99 330)	% Uninsured (n = 18 062)	Estimated Population, Thousands (n = 282 378)	% Insured (n = 249 551)	% Uninsured (n = 32 378)	
All adults	163 600	83.1	16.9	197 217	85.2	14.8	<.001
Age group, y							
18-24	24 257	73.6	26.4	31 019	82.7	17.3	<.001
25-34	39 234	79.8	20.2	43 688	80.8	19.2	.08
35-44	42 822	85.0	15.0	40 469	83.8	16.2	.01
45-54	33 895	87.8	12.2	40 428	87.7	12.3	.84
55-64	23 332	88.4	11.6	41 613	90.7	9.3	<.001
Sex							
Male	81 250	82.3	17.7	98 070	83.4	16.6	.002
Female	82 351	83.9	16.1	99 073	87.0	13.0	<.001
Race/ethnicity							
White	119 616	86.9	13.1	115 498	90.4	9.6	<.001
Black	16 872	77.9	22.1	24 423	83.4	16.6	<.001
Hispanic	18 839	65.1	34.9	35 823	67.9	32.1	.01
Other	7639	80.5	19.5	18 202	89.4	10.6	<.001
Adjusted income, \$ ^a							
<15 000	7404	59.1	40.9	13 105	73.0	27.0	<.001
15 000-24 999	7370	58.3	41.7	26 891	71.4	28.6	<.001
25 000-34 999	25 561	68.0	32.0	16 061	78.7	21.3	<.001
35 000-49 999	24 051	82.3	17.7	21 008	84.8	15.2	<.001
50 000-74 999	29 799	91.4	8.6	24 434	91.4	8.6	.94
>75 000	48 491	95.6	4.4	61 581	96.3	3.7	.004
Census region							
Northeast	31 614	86.4	13.6	34 404	89.7	10.3	<.001
Midwest	37 615	87.8	12.2	40 995	88.6	11.4	.02
South	57 740	79.6	20.4	74 536	80.3	19.7	.16
West	36 631	81.0	19.0	47 283	86.8	13.2	<.001
Employment status							
Employed	108 476	87.1	12.9	113 000	88.1	11.9	<.001
Self-employed	14 379	72.5	27.5	19 703	75.4	24.6	.002
Unemployed	7552	55.8	44.2	12 808	71.5	28.5	<.001
Not in labor force	32 879	81.2	18.8	49 743	86.5	13.5	<.001
Education							
High school or less	70 882	75.0	25.0	80 390	75.9	24.1	.04
Some college	46 267	85.9	14.1	61 688	88.7	11.3	<.001
Beyond college	46 169	93.0	7.0	54 603	95.0	5.0	<.001
Self-reported health status							
Excellent	42 330	87.5	12.5	37 990	87.3	12.7	.76
Very good	57 320	86.3	13.7	63 513	89.5	10.5	<.001
Good	44 852	79.1	20.9	62 404	82.6	17.4	<.001
Fair	14 384	72.1	27.9	24 672	78.9	21.1	<.001
Poor	4485	78.0	22.0	8313	81.4	18.6	.01
Marital status							
Married	97 958	88.1	11.9	97 017	89.5	10.5	<.001
Divorced	16 941	77.7	22.3	19 980	83.9	16.1	<.001
Widowed	3416	79.9	20.1	4148	85.0	15.0	.002
Separated	3937	71.1	28.9	5543	72.6	27.4	.40
Never married	36 261	75.5	24.5	57 781	81.8	18.2	<.001
Unmarried couple	4783	69.9	30.1	11 708	75.1	24.9	<.001

(continued)

Table 1. Changes in the Unadjusted Proportion of Uninsured US Adults Aged 18 to 64 Between 1997 and 2017 by Demographic and Clinical Characteristics (continued)

Characteristic	1998			2017			P Value
	Estimated Population, Thousands (n = 117 392)	% Insured (n = 99 330)	% Uninsured (n = 18 062)	Estimated Population, Thousands (n = 282 378)	% Insured (n = 249 551)	% Uninsured (n = 32 378)	
Chronic disease							
Hypertension	28 632	85.1	14.9	49 400	87.5	12.5	<.001
Cholesterol	27 286	89.6	10.4	46 094	89.0	11.0	.22
Diabetes	6608	85.0	15.0	14 971	88.2	11.8	<.001
Obesity	35 579	81.1	18.9	54 769	85.9	14.1	<.001
CVD	1341	85.2	14.8	9520	86.3	13.7	.56
Binge drinking	24 827	79.1	20.4	36 665	85.1	14.9	<.001
Active smoking	41 871	76.2	23.8	34 527	78.0	22.0	<.001

Abbreviation: CVD, cardiovascular disease.

^a Adjusted for inflation as measured by the Consumer Price Index.¹⁹**Table 2. Proportion of Uninsured, Insured, and Overall Population Unable to See a Physician Because of Cost**

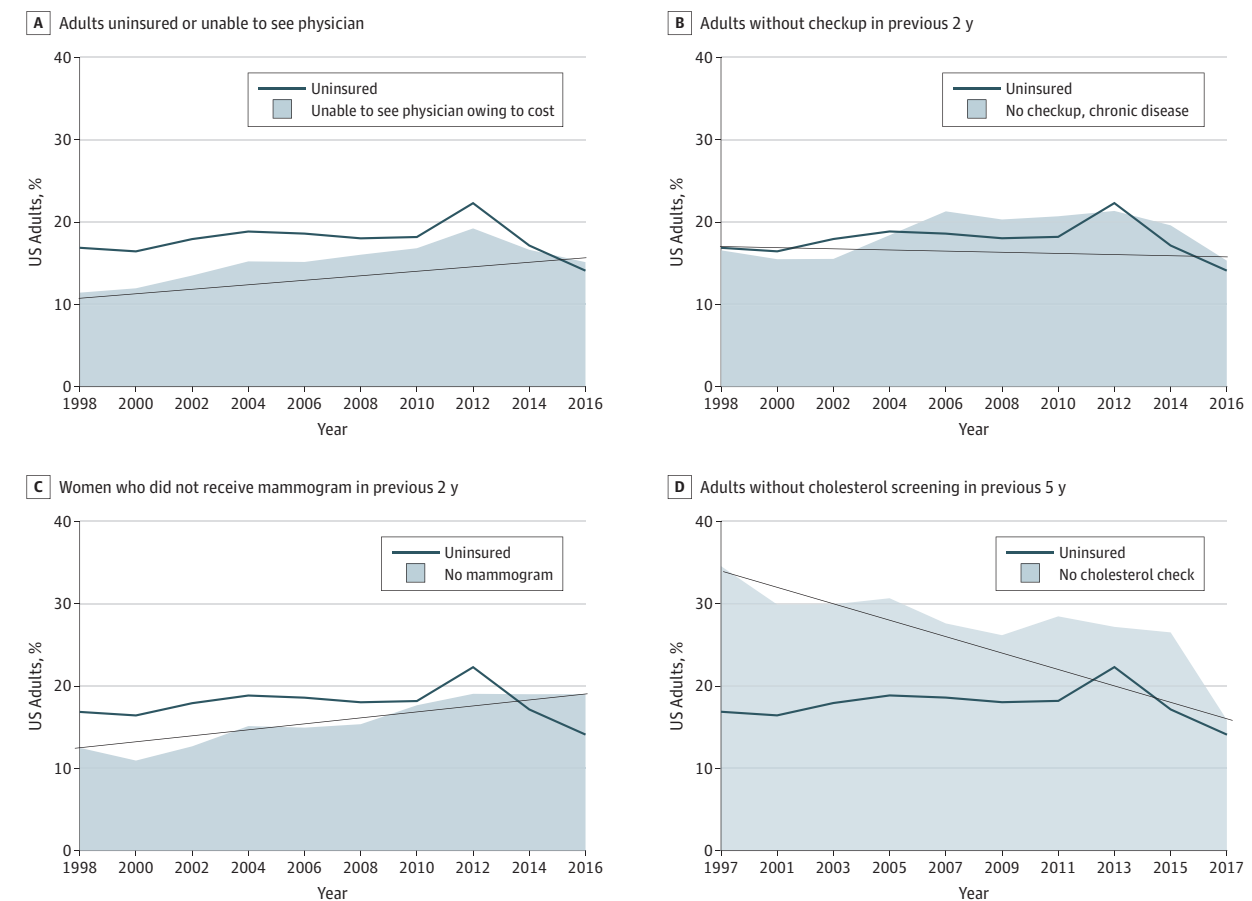
Variable	Overall Population, %			Uninsured, %			Insured, %		
	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a
Total No.	117 392	282 378	NA	18 062	32 378	NA	99 330	249 551	NA
All adults, 18-64 y	11.4	15.7	2.7 (2.2 to 3.8)	32.9	39.6	5.9 (4.1 to 7.8)	7.1	11.5	3.6 (3.2 to 4.0)
Race/ethnicity									
White	9.8	13.3	3.1 (2.6 to 3.6)	32.4	40.4	7.9 (5.8 to 10.0)	6.4	10.4	3.6 (3.2 to 4.1)
Black	14.7	18.8	2.2 (0.7 to 3.7)	38.0	44.3	5.7 (0.9 to 10.6)	8.1	13.7	4.2 (2.9 to 5.6)
Hispanic	18.8	21.9	5.4 (-1.3 to 2.3)	33.3	37.5	1.2 (-2.7 to 5.2)	11.0	14.5	2.0 (0.3 to 3.8)
Other	10.8	13.5	2.9 (0.8 to 5.0)	25.5	36.6	11.8 (4.6 to 19.0)	7.2	10.8	3.5 (1.5 to 5.5)
Adjusted income, \$ ^b									
<15 000	28.9	28.5	-1.8 (-4.2 to 0.7)	46.9	48.6	0.9 (-4. to 5.9)	16.3	21.0	3.7 (1.3 to 6.0)
15 000-24 999	30.5	26.6	-4.5 (-6.8 to -2.3)	43.7	44.6	2.3 (-1.8 to 6.3)	21.0	19.5	-1.9 (-4.5 to 0.7)
25 000-34 999	21.1	21.4	0.9 (-0.6 to 2.4)	35.9	40.3	7.4 (3.6 to 11.2)	14.1	16.3	2.6 (1.1 to 4.1)
35 000-49 999	12.5	17.8	5.4 (4.2 to 6.6)	27.3	38.0	11.6 (7.6 to 15.6)	9.3	14.1	5.1 (3.9 to 6.2)
50 000-74 999	6.9	12.4	5.7 (4.8 to 6.6)	23.7	31.5	8.3 (3.5 to 13.2)	5.3	10.6	5.5 (4.7 to 6.3)
>75 000	5.6	9.3	2.8 (2.3 to 3.2)	24.9	31.8	4.9 (0.8 to 9.0)	3.6	7.2	2.8 (2.4 to 3.3)
Conditions									
Any chronic disease ^c	14.6	18.7	2.4 (1.5 to 3.4)	39.6	46.1	4.4 (1.1 to 7.7)	8.9	14.1	4.3 (3.4 to 5.1)
Hypertension ^d	15.6	19.0	2.3 (1.2 to 3.4)	48.2	52.1	4.4 (0.2 to 8.7)	9.9	14.2	3.8 (2.8 to 4.8)
Cholesterol ^d	12.5	17.6	3.5 (2.5 to 4.5)	44.7	50.1	5.3 (0.3 to 10.3)	8.8	13.6	4.3 (3.4 to 5.2)
Diabetes	16.9	20.5	1.5 (-0.8 to 3.9)	50.0	49.5	-2.4 (-9.8 to 4.9)	11.0	16.6	4.6 (2.3 to 6.8)
Obesity	14.4	17.8	2.2 (1.3 to 3.3)	38.8	44.8	4.5 (1.0 to 8.0)	8.7	13.4	4.1 (3.2 to 5.0)
CVD	15.0	25.6	5.9 (1.7 to 10.1)	41.0	59.4	10.4 (-2.5 to 23.4)	10.6	20.3	6.9 (3.0 to 10.8)
Binge drinking ^d	12.6	16.1	3.1 (2.0 to 4.3)	34.3	43.9	7.9 (3.5 to 12.3)	7.1	11.3	4.0 (3.1 to 5.0)
Smoking	9.4	13.6	2.8 (2.3 to 3.3)	29.9	36.5	5.0 (2.7 to 7.2)	5.9	10.2	3.6 (3.1 to 4.0)
Health status									
Excellent	6.4	8.2	1.0 (0.2 to 1.7)	20.5	22.9	2.0 (-1.6 to 5.7)	4.3	6.1	1.3 (0.6 to 1.9)
Very good	8.8	10.3	1.8 (1.1 to 2.5)	27.4	30.9	4.2 (1.0 to 7.5)	5.8	7.9	2.5 (1.9 to 3.0)
Good	13.8	17.3	2.8 (1.9 to 3.7)	34.6	38.5	5.0 (2.0 to 8.1)	8.3	12.8	4.2 (3.4 to 5.0)
Fair	23.6	29.9	5.1 (3.1 to 7.1)	48.3	59.5	12.2 (7.4 to 17.0)	14.0	22.1	7.2 (5.2 to 9.1)
Poor	29.4	35.9	3.6 (0.4 to 6.9)	63.2	70.8	5.4 (-1.4 to 12.3)	19.9	28.0	7.1 (3.9 to 10.3)

All outcomes are analyzed using data from 1998 and 2017 unless otherwise specified.

Abbreviation: CVD, cardiovascular disease.

^a All data in the Change category are controlled for age, race/ethnicity, census, region, employment status, and inflation-adjusted income.^b Adjusted for inflation as measured by the Consumer Price Index.¹⁹^c Composite variable of diabetes, obesity, or CVD from the 1998/2017 data set.^d Analyzed using data from 1997 and 2017.

Figure. The Proportion of US Adults Aged 18 to 64 Years Reporting Unmet Health Needs, 1998-2017 (Unadjusted)



A, The proportion of uninsured US adults aged 18 to 64 years and those unable to see a physician because of cost. Data for unable to see a physician owing to cost were unavailable in 2002; data were interpolated. The percentage point change in those unable to see a physician owing to cost was 4.3. B, The proportion of US adults aged 18 to 64 years without a checkup in the previous 2 years among those with chronic disease (diabetes, obesity, or cardiovascular disease). Checkup data were unavailable in 2004; data were interpolated. The percentage point change in those without a checkup in the prior 2 years was -0.5. C, The proportion of US women aged 50 to 64 years who did not receive a mammogram in the previous 2 years. The percentage point change in those who did not receive a mammogram was 6.6. D, The proportion of US adults aged 18 to 64 years (men >35; women >45) who did not receive a cholesterol screen in the previous 5 years. The percentage point change in those who did not receive a cholesterol screen in the previous 5 years was -18.5. The straight line in each panel indicates the difference in proportion reporting each outcome between 1998 and 2017.

obesity, or cardiovascular disease) said they were unable to see a physician owing to cost. In contrast, we found improvements in the proportions receiving 2 clinically indicated preventive services, but worsening for another; little change was observed in the proportions who had received checkups in the prior 2 years.

Our finding that financial access to physician care worsened is concerning. Persons with conditions such as diabetes, hypertension, cardiovascular disease and poor health status risk substantial harms if they forego physician care. Financial barriers to care have been associated with increased hospitalizations and worse health outcomes in patients with cardiovascular disease and hypertension,^{14,23} and increased morbidity among patients with diabetes.^{15,24}

Our results provide important context for understanding the consequences of ACA. The implementation of the ACA's major coverage provisions in 2014 was associated with a 10 percentage point increase in coverage, and improvements in mea-

asures of access to care.^{25,26} For example, between 2012 and 2014 the proportion of US individuals who reported skipping care because of costs decreased from 43% to 36%, and the number of persons reporting difficulty paying medical bills decreased by 11 million.²⁷ Our findings suggest that these substantial short-term improvements were outweighed by longer-term trends toward reduced affordability. Coverage and access rates were decreasing prior to the ACA²⁸ and improvements from the ACA mostly returned access to levels prevalent in 1998 or left them worse.

While the absolute proportion of those in the lowest income groups reporting unmet health needs were significantly higher than those in the highest income groups throughout the study period, we note that the lowest income groups experienced the smallest increase in inability to see a physician because of cost. This finding may be explained by substantial yearly increases in Medicaid enrollment that began in 2000.²⁹

Table 3. Proportion of Uninsured, Insured, and Overall Population Who Did Not Have a Checkup Within 2 Years by Health Condition

Variable	Overall Population, %			Uninsured, %			Insured, %		
	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a
Total No.	117 392	282 378	NA	18 062	32 378	NA	99 330	249 551	NA
Conditions									
Any chronic disease ^b	16.6	16.1	-0.5 (-1.5 to 0.4)	32.7	35.3	-5.2 (-8.4 to -2.0)	12.9	12.9	-1.1 (-1.9 to -0.1)
Hypertension ^c	13.1	11.8	-0.7 (-1.7 to 0.2)	23.6	29.2	6.8 (3.1 to 10.5)	11.2	9.4	-1.0 (-2.0 to -0.1)
Cholesterol ^c	10.9	10.5	-0.3 (-1.2 to 0.7)	20.1	24.9	4.6 (0.6 to 8.6)	9.9	8.7	-0.4 (-1.3 to 0.6)
Diabetes	6.6	7.4	1.5 (0.1 to 3.0)	16.0	20.8	7.0 (1.3 to 12.6)	4.6	5.6	1.4 (0.1 to 2.8)
Obesity	17.5	17.1	0.3 (-0.7 to 1.3)	34.0	36.9	5.3 (1.8 to 8.8)	13.7	13.9	0.9 (-0.1 to 1.9)
CVD	10.1	12.2	3.0 (-0.4 to 6.5)	18.5	30.0	2.9 (-10.3 to 16.2)	8.6	9.4	4.0 (1.3 to 6.7)
Binge drinking ^c	28.4	25.0	-0.4 (-1.9 to 1.0)	43.6	47.4	5.9 (1.4 to 10.5)	24.5	21.2	-0.4 (-1.9 to 1.1)
Smoking	17.7	17.7	1.0 (-0.1 to 1.1)	30.8	36.0	6.0 (3.7 to 8.2)	15.5	15.0	0.6 (-0.01 to 1.2)
Health status									
Excellent	20.8	19.9	0.01 (-1.2 to 1.1)	35.5	41.1	6.8 (2.3 to 11.2)	18.7	16.8	-0.5 (-1.6 to 0.6)
Very good	18.7	18.8	1.3 (0.4 to 2.1)	32.6	39.8	8.0 (4.7 to 11.3)	16.5	16.4	1.2 (0.3 to 2.0)
Good	20.4	19.9	0.1 (-1.1 to 0.9)	35.6	38.3	4.3 (1.2 to 7.4)	16.4	16.0	0.4 (-0.6 to 1.4)
Fair	19.8	19.3	0.1 (1.9 to 2.0)	36.9	41.6	7.7 (2.9 to 12.5)	13.3	13.4	0.4 (-1.5 to 2.2)
Poor	13.2	16.3	3.7 (1.3 to 6.2)	25.5	37.7	12.2 (4.8 to 19.7)	9.7	11.9	3.4 (1.2 to 5.7)

All outcomes are analyzed using data from 1998 and 2017 unless otherwise specified.

Abbreviation: CVD, cardiovascular disease.

^a All data in the change category are controlled for age, race/ethnicity, census,

region, employment status, and inflation-adjusted income.

^b Composite variable of diabetes, obesity, or CVD from the 1998/2017 data set.

^c Analyzed using data from 1997 and 2017.

Table 4. Proportion of Uninsured, Insured, and Overall Population Who Did Not Receive Clinically Indicated Preventive Services, 1998 and 2017

Variable	Overall Population, %			Uninsured, %			Insured, %		
	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a	1998	2017	Change, % (95% CI) ^a
Total No.	117 392	282 378	NA	18 062	32 378	NA	99 330	249 551	NA
General prevention									
Cholesterol ^b	34.6	15.9	-16.8 (-17.4 to -16.1)	56.1	32.6	-21.4 (-23.4 to -19.4)	30.1	13.1	-15.1 (-15.7 to -14.5)
Flu shot ^b	79.4	65.1	-13.2 (-13.8 to -12.7)	87.2	81.4	-4.3 (-5.8 to -2.8)	77.8	62.4	-14.2 (-14.9 to -13.6)
Cancer screening									
Mammogram ^c	12.5	19.1	6.7 (5.5 to 7.8)	28.5	37.6	10.0 (4.9 to 15.1)	10.8	19.3	7.2 (6.0 to 8.3)

^a All data in the change category are controlled for age, race/ethnicity, census, region, employment status, and inflation-adjusted income.

^b Analyzed using data from 1997 and 2017.

^c Analyzed using data from 1998 and 2016.

The long-term increase in the proportion of uninsured persons reporting they were unable to see a physician because of cost implicates factors unrelated to coverage, eg, decreasing affordability of physician visits relative to income or decreasing availability of safety-net health care.³⁰ The increase among the insured suggests that increasing copayments and deductibles have decreased the affordability of physician visits for this group.

Our findings are consistent with evidence of growing underinsurance (and resulting problems in access), especially among persons with employer-based plans.³¹⁻³³ Enrollment in a high-deductible health plan, which has become increasingly common in the last decade, a trend uninterrupted by the ACA,^{3,34} is associated with forgoing needed care, especially among those of lower socioeconomic status.^{35,36} Other changes in insurance benefit design, such as imposing tiered copayments and coinsurance obligations, eliminating coverage for

some services (eg, eyeglasses), and narrowing provider networks (which can force some patients to go out of network for care) may also have undermined the affordability of care.³⁷⁻³⁹

The increasing cost of health care creates an access barrier for the insured as well as the uninsured; the RAND Corporation estimated that total expenditures (including premiums, out-of-pocket costs, and taxes on health care) nearly doubled for US consumers between 1999 and 2009, far outpacing inflation.⁴⁰ Although many insured adults reported access barriers, the situation remained worse for the uninsured, highlighting the importance of covering the 29 million US individuals who remain uninsured.

The current level of unmet health needs in the US that we found far exceed those of similar countries. Among nations in the Organisation for Economic Co-operation and Development, an average of 9.1% of persons reported skipping health care because of cost in 2017,⁴¹ compared to the 15.7% we found

in the US. In Canada, only 1% of adults 45 years old or older with a chronic disease reported a cost-related unmet health need – compared with 18.7% of adults with a chronic medical condition in our US sample.¹⁴ A health care system that offers universal health coverage and eliminates out-of-pocket expenses for patients may be the most practical solution to improving unmet health needs in the US.

The main encouraging finding from our analysis is the increase in the proportion of persons—both insured and uninsured—receiving cholesterol checks and flu shots. This increase may be attributable to the increasing implementation of quality metrics, financial incentives and improved systems for the delivery of these services. However, despite the ACA's elimination of cost-sharing for many preventive services, including cancer screening, the proportion of women who did not receive mammography increased steadily throughout the study period, plateauing but not improving after the implementation of the ACA. This finding was consistent with other studies which have demonstrated a decrease in mammography rates among women aged 18 to 64 years.^{42,43} The reasons for this worsening are unclear.

Limitations

Our study has several limitations. To account for rapidly increasing rates of cell phone use and improve sample representativeness, in 2011 the BRFSS changed its sampling methodology to include cell phones, and changed its weighting procedure accordingly.⁴⁴ This change likely affected prevalence estimates for responses to survey items in the short term, and should be considered particularly in interpretation of the year-by-year graphs, but is unlikely to greatly distort estimates such as ours that assess years far removed from 2011. The BRFSS administrators acknowledges the decrease in re-

sponse rate to its survey in recent years which is, notably, 28% during the study period. This is consistent with response rates in most population-based surveys, particularly telephone-based surveys, in the United States. However, weighting to demographic characteristics of respondents should ensure reasonably accurate estimates for most BRFSS measures.⁴⁵ All data were self-reported and we lacked clinical detail about study participants. Therefore, we are unable to examine whether the worsening access measures documented here resulted in worsening clinical outcomes.

Despite these limitations, our analysis provides a longer-term perspective on the ACA achievements. This study also offers contemporary data on current levels of unmet health care needs, which have not improved appreciably in the 2 decades since the study by Ayanian et al.¹ Like those authors, we found high levels of unmet medical needs, even after the ACA, and confirmed the importance of health insurance in enabling US individuals to get the care they need.

Conclusions

Voters' dissatisfaction with the health care system has spawned a renewal of debate over health reform,^{46,47} suggesting that the ACA's improvements were insufficient to fully address the health care needs of many US adults. Covering the 29 million who remain uninsured would ameliorate, but not resolve the access to care problems we identified. Additional measures should address the problems in affording care that face many insured US adults. Other nations have achieved universal coverage and substantially reduced cost barriers.⁴⁸ Experience in those nations should inform discussion of the additional reforms required to address the unmet health needs of US adults.

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Acquisition, analysis, or interpretation of data:

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