Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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RESEARCH ARTICLE

The First Year of the COVID-19 Pandemic: Changes in Preventive Services in Community Health Centers

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Introduction: Community Health Centers provide comprehensive primary healthcare services to many underserved populations. It is unknown how routine preventive and chronic care services in Community Health Centers may have changed nationwide during the COVID-19 pandemic.

Methods: The 2014–2020 Health Resources and Services Administration Uniform Data System of Community Health Centers was used, and data analysis was conducted from November 2021 to May 2022. Data for clinical quality measures in 2020 were treated as during the pandemic, whereas receipt of care in 2019 and before were treated as before the pandemic. Outcomes included 6 clinical quality measures of being up to date for colorectal cancer screening, cervical cancer screening, tobacco screening and cessation counseling, BMI screening and follow-up, depression screening and follow-up, and aspirin use for ischemic vascular disease. A mixed effects regression model was used to estimate changes in measures by year.

Results: Between 2019 and 2020, receipt of preventive services declined for each of the 6 clinical quality measures: from 40.8% to 37.7% for colorectal cancer screening, from 48.8% to 44.9% for cervical cancer screening, from 85.8% to 83.4% for tobacco screening and cessation counseling, from 70.7% to 65.4% for BMI screening and follow-up, from 71.1% to 64.9% for depression screening and follow-up, and from 81.5% to 79.4% for aspirin use for ischemic vascular disease.

Conclusions: Receipt of preventive services in Community Health Centers declined during the COVID-19 pandemic for each of the 6 clinical quality measures considered in the study. Immediate action is required to support ongoing high-quality, primary healthcare services in Community Health Centers across the nation.

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INTRODUCTION

Community Health Centers (CHCs) play an important role in providing comprehensive primary healthcare services, including preventive and chronic care, to underserved populations, many of whom are uninsured.[1,2] Evidence of changes in preventive care among CHCs during the coronavirus disease 2019 (COVID-19) pandemic is limited. According to a small-scale study, approximately 50%–90% of CHCs stopped offering colorectal cancer screening and cervical cancer screening, respectively, during the pandemic.[3] Another study based on data from 36 CHCs across 19 states also found pandemic-related gaps in combined visit volumes for cervical cancer screening, depression screening and follow-up, and adult weight assessment despite increases in telehealth visits during this time.[4] Declines in care delivery reported among CHCs are consistent with a cumulative 9.1% decline in outpatient care visits among commercial- and Medicare Advantage–insured persons between January and June 2020 before, during, and after the Centers for Medicare and Medicaid

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Services issued guidance to delay all nonurgent visits owing to the COVID-19 pandemic in March 2020.[5,6] Yet, no previous study has examined the association of the COVID-19 pandemic and multiple preventive and chronic care services among CHCs nationwide.

It is imperative to consider the effect of the COVID-19 pandemic on routine preventive and chronic care services within CHCs nationwide because findings will have important implications for long-term health outcomes among vulnerable populations served. Using data from a nationwide sample of CHCs, this study assessed changes during the first year of the COVID-19 pandemic in the provision of preventive care and chronic disease management through clinical quality measures that serve as proxies for long-term health outcomes.[7,8]

METHODS

Data for this cross-sectional study were obtained from the 2014 to 2020 Health Resources and Services Administration Uniform Data System (UDS) as reported nationwide by each CHC that received federal funds under the Health Center Programs authorized through Section 330 of the Public Health Service Act.[8] CHCs located in U.S. Territories were excluded from the analysis. The UDS provides information on demographic, clinical, operational, and financial data per CHC. From 2014 to 2020, between 1,278 and 1,385, CHCs were included, serving 22–29 million patients each year. UDS data are publicly available, deidentified, and ecologic in nature (aggregated at the CHC organization level).

Study Sample

The UDS collects data on 15 clinical quality measures that reflect services identified by the U.S. Preventive Services Task Forces with high certainty that their net health benefit is substantial or moderate to substantial and therefore can serve as a proxy for long-term health outcomes.[7−14] Of these, the study considered 6 measures that had data available from 2014 to 2020, with at least one million patients seen across all CHCs to ensure sufficient data to conduct analysis for measures by year. These measures included up-to-date (UTD) colorectal cancer screening, cervical cancer screening, tobacco screening and cessation counseling, adult BMI screening and follow-up, depression screening and follow-up, and aspirin use for ischemic vascular disease (IVD). A detailed description of each measure with the time period required to be UTD is available in Appendix Table 1 (available online).

Measures

The primary exposure for this paper was year as a proxy for the COVID-19 pandemic. Data for clinical quality measures in 2020 were treated as during the pandemic, whereas data for clinical quality measures in 2019 and earlier were treated as before the pandemic. Data from 2014 to 2018 were also included to assess trends in previous years.

All covariates were at the CHC level. Continuous variables included distributions of age (patients aged 18−64 years), racial/ethnic (patients identified as non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian, non-Hispanic Native Hawaiian/other Pacific Islander, non-Hispanic American Indian/Alaska Native, and non-Hispanic multiple races), language (best served in a language other than English), poverty level (at or below 100% of the federal poverty level [FPL]), insurance status (uninsured, Medicaid insured, Medicare or dually insured [2014 was Medicare only], privately insured, and other publicly insured), sex (male), and CHC population size (total unique patients).[8] Continuous covariates were categorized into ranked balanced tertiles of low, medium, and high proportions on the basis of a previous study.[15] Categorical variables for location (urban versus rural), Section 330 funding types the CHCs received (CHC funding, Migrant Health Center funding, Health Care for the Homeless funding, Public Housing Primary Care [PH] funding), and state expansion of Medicaid to low-income adults by 2019 were also considered.

Statistical Analysis

Descriptive statistics of covariates in 2014−2018, 2019, and 2020 were estimated as means and 95% CIs through normal distribution. A test of association was run using either *t*-test (2 groups) or ANOVA (≥3 groups) on the basis of variable response options to estimate the difference in time trends by sociodemographic covariates. Collinearity between covariates was assessed using 2 methods. A Pearson correlation matrix found an absolute correlation coefficient >0.7 among the proportion of Hispanic patients and patients best served in a language other than English. A regression model found that the proportion of patients best served in a language other than English and CHCs Medicaid expansion status had variance inflation factors >2.5, indicating that both variables were significantly associated with other independent variables in the model. On the basis of these analyses, patients best served in a language other than English and CHCs Medicaid expansion status were excluded from further analyses. A proportion of Native Hawaiian/other Pacific Islander, American Indian/Alaska Native, multiple races, and other publicly insured were excluded from the model because of low sample size. Tukey's Fence method was used to detect outliers in the clinical quality measures. Values that were above/below the upper/lower limit of the upper/lower quartile plus/minus 1.5 times the IQR were removed from the model.[16,17] The average rates for each clinical quality measure, after this exclusion, varied at most by 3% compared with the original rates. Mixed effects regression models were used to estimate changes in clinical quality measures between years and also through an interaction model with levels of sociodemographic variables, adjusting for random clustering of health centers within states. Covariates were included as fixed effects in the model. CIs were calculated using a normal distribution with chi-square estimation. SAS statistical software was used for all analyses.

RESULTS

Table 1 provides descriptive statistics for all covariates in 2014−2018, 2019, and 2020. Covariates were generally similar across the 3 time periods. For example, the proportion of patients aged 18−64 years remained at 62.6%−64.0%, and the proportion of Hispanic patients remained at 26.4%−27.6%. Exceptions to this pattern were the proportion of clinics in urban locations, which increased from 51.5% in 2014−2018 to 57.8% in 2019

Table 1. Mean Proportion of Patients With Characteristics in Each CHC From 2014 to 2020, Uniform Data System

Variables	2014–2018, % (95% CI)			2019, % (95% CI)	2020, % (95% CI)
	2014	2016	2018		
n	1,278	1,367	1,362	1,385	1,375
Age distribution					
18–64 years	64.0 (63.7, 64.3)			62.6 (61.9, 63.2)	63.6 (63.1, 64.2)
Male	43.4 (43.2, 43.6)			43.6 (43.3, 44.0)	43.5 (43.2, 43.8)
Location					
Urban	51.5 (50.3, 52.7)			57.8 (55.2, 60.4)	58.0 (55.4, 60.6)
Race/ethnic distribution					
White	41.9 (41.1, 42.6)			41.0 (39.4, 42.5)	41.5 (39.9, 43.0)
Black	19.0 (18.5, 19.6)			18.4 (17.2, 19.6)	19.4 (18.1, 20.6)
Hispanic	26.4 (25.7, 27.0)			27.4 (25.9, 28.8)	27.6 (26.2, 29.0)
Asian	3.1 (2.9, 3.3)			3.2 (2.7, 3.7)	3.6 (3.0, 4.1)
Native Hawaiian/other Pacific Islander	1.2 (1.0, 1.4)			1.1 (0.7, 1.6)	1.9 (1.1, 2.6)
American Indian/Alaska Native	2.2 (2.0, 2.5)			2.0 (1.5, 2.5)	2.7 (2.1, 3.4)
More than 1 race	1.1 (1.0, 1.1)			1.4 (1.3, 1.5)	1.5 (1.4, 1.6)
Language					
Best served in a language other than English	18.7 (18.2, 19.3)			19.8 (18.6, 21.0)	20.9 (19.6, 22.1)
Poverty level					
At or below 100 of the federal poverty level	66.5 (66.1, 67.0)			64.3 (63.4, 65.3)	63.8 (62.8, 64.8)
Insurance type distribution					
Uninsured	26.7 (26.3, 27.2)			24.9 (23.9, 25.8)	24.1 (23.1, 25.0)
Medicaid	43.0 (42.5, 43.5)			42.7 (41.8, 43.7)	42.2 (41.3, 43.2)
Medicare and dually eligible (2014 Medicare only)	13.4 (13.2, 13.6)			15.0 (14.5, 15.5)	16.5 (15.7, 17.3)
Private	19.2 (18.9, 19.5)			20.6 (19.9, 21.3)	22.9 (22.3, 23.6)
Other public	0.9 (0.8, 1.0)			0.7 (0.6, 0.8)	0.8 (0.6, 0.9)
Homeless	7.5 (7.1, 8.0)			7.1 (6.2, 8.0)	7.8 (6.8, 8.8)
CHC funding type					
No CHC funding	6.0 (5.4, 6.6)			5.3 (4.1, 6.5)	5.2 (4.0, 6.3)
MHC funding	12.8 (12.1, 13.6)			12.6 (10.9, 14.4)	12.7 (11.0, 14.5)
HO funding	21.5 (20.6, 22.5)			21.7 (19.5, 23.8)	21.7 (19.6, 23.9)
PH funding	7.5 (6.9, 8.2)			7.8 (6.4, 9.2)	7.8 (6.4, 9.2)
Medicaid expanded as of 2019	70.0 (68.9, 71.1)			70.3 (67.9, 72.7)	70.2 (67.8, 72.6)
Number of unique patients per clinic	19,041 (18,493, 19,589)			21,543 (20,146, 22,939)	20,793 (19,396, 22,190)

CHC, Community Health Center; HO, Health Care for the Homeless; MHC, Migrant Health Center; PH, Public Housing Primary Care.

and to 58.0% in 2020, primarily driven by an increase in the number of urban clinics as the number of total clinics increased from 1,278 in 2014 to 1,375 in 2020.

Figure 1 and Table 2 show the year-over-year changes in the 6 clinical quality measures from 2014 to 2020. Between 2019 and 2020, clinical quality measures statistically significantly declined for each of the 6 services. Notably, for colorectal cancer screening, BMI screening and follow-up, and depression screening and follow-up, the declines were a reversal from year-over-year changes from 2014 to 2019. Colorectal cancer screening decreased from 40.8% in 2019 to 37.7% in 2020, after continuously increasing year over year between 1.1% and 3.8% points from 2014 to 2019. BMI screening decreased from 70.7% to 65.4% in 2020, after year-over-year increases between 1.6% and 6.4% points between 2014 and 2019. Depression screening and follow-up decreased from 71.1% to 64.9% in 2020, after year-over-year increases between 2.0% and 10.7% points between 2014 and 2019. Cervical cancer screening, tobacco screening and cessation counseling, and aspirin use for IVD decreased from 48.8% to 44.9%, 85.8% to 83.4%, and 81.5% to 79.4%, respectively, between 2019 and 2020.

Table 3 depicts the changes in the receipt of the 6 clinical quality measures between 2019 and 2020 by

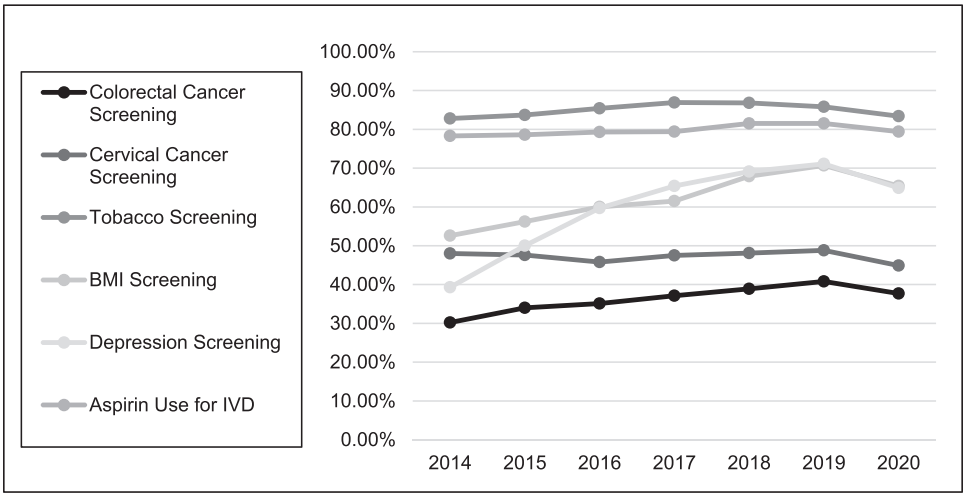

Figure 1. Clinical quality measures over time from 2014 to 2020, Uniform Data System.
IVD, ischemic vascular disease.

sociodemographic factors. The decline in colorectal cancer screening between 2019 and 2020 was largest in CHCs with a greater proportion of uninsured patients (medium: −3.9%; high: −3.0%), Hispanic patients (high: −3.7%), and patients who are at or below 100% FPL (high: −3.2%) than in CHCs with the lowest tertile of these factors and in PH- than in non-PH–funded clinics (−3.6%) and in urban than in rural clinics (−3.4%). Similarly, the decline in UTD cervical cancer screening from 2019 to 2020 was larger in CHCs with a greater proportion of uninsured patients (medium: −2.5%) and patients without homes (medium: −3.3) than in CHCs at the lowest tertile and in PH- than in non-PH–funded clinics (−3.5%) and in urban than in rural clinics (−2.9%). For both colorectal and cervical cancer screening, declines were not as drastic for clinics with greater proportions of White (colorectal medium: 3.8 high: 4.5, cervical high: 2.8) and privately insured (colorectal high: 3.8, cervical high: 3.2) patients as for clinics with the lowest tertile of these factors. The decline in BMI screening and follow-up was highest in CHCs with greater proportions of patients at or below 100% of the FPL (high: −4.6%) than in CHCs with the lowest tertile. The decline in UTD depression screening and follow-up was lower in clinics with greater proportions of patients at or below 100% of the FPL (high: −4.0%) and Medicaid patients (medium: −4.5%, high: −4.2%) than in CHCs at the lowest tertile and in PH- than in non-PH–funded clinics (−6.8%). The decline in UTD aspirin use for IVD was greater in clinics that received PH funding than in those without PH funding (−3.0%). Additional estimates and differentials are depicted in Appendix Table 2 (available online).

DISCUSSION

In this nationwide study of CHCs during the COVID-19 pandemic, there was a clear decline in 6 clinical quality measures that can serve as proxies for long-term health outcomes.[7−14] The declines in colorectal cancer screening, BMI screening and follow-up, and depression screening and follow-up represented a divergence from improvements observed in previous years, likely related to competing priorities and the urgent and acute needs of the early part of the COVID-19 pandemic. Declines were largest for clinical quality measures in CHCs serving high proportions of Hispanic, uninsured, persons ≤100% of the FPL, persons without homes, and PH-funded clinics.

Changes between 2019 and 2020 indicate a shift from trends in 2014 to 2019, with changes for 3 of 6 measured outcomes being a reversal, suggesting that declines are associated with pandemic-related care disruptions. Before 2020, colorectal cancer screening, BMI screening and follow-up, and depression screening and follow-up increased annually. Cervical cancer screening, tobacco screening and cessation, and aspirin use for IVD remained steady from 2014 to 2019. In fact, before the pandemic, 4 of the 6 measures in this study met or exceeded the associated national screening targets.[18,19] Yet, during the pandemic, all clinical quality measures significantly declined. An important consideration for

Table 2. Adjusted Year-Over-year Changes in Quality-of-Care Measures

Variables	2014, % (95% CI)	2015, % (95% CI)	2016, % (95% CI)	2017, % (95% CI)	2018, % (95% CI)	2019, % (95% CI)	2020, % (95% CI)
Colorectal cancer screening							
Overall	30.2 (28.2, 32.2)	34.0 (32.0, 36.0)	35.1 (33.1, 37.1)	37.1 (35.1, 39.1)	38.9 (36.9, 40.9)	40.8 (38.8, 42.8)	37.7 (35.4, 40.0)
Year-over-year change		**3.8 (2.9, 4.7)**	**1.1 (0.2, 1.9)**	**2.1 (1.2, 2.9)**	**1.8 (1.0, 2.6)**	**1.9 (1.1, 2.7)**	**−3.1 (−4.5, −1.8)**
Cervical cancer screening							
Overall	48.0 (46.0, 50.0)	47.6 (45.7, 49.5)	45.8 (43.9, 47.8)	47.5 (45.5, 49.4)	48.1 (46.1, 50.0)	48.8 (46.9, 50.8)	44.9 (42.7, 47.0)
Year-over-year change		−0.4 (−1.2, 0.4)	−1.8 (−2.6, −1.0)	**1.6 (0.8, 2.4)**	0.6 (1.4, −0.2)	0.8 (0.0, 1.5)	**−4.0 (−5.2, −2.7)**
Tobacco cessation							
Overall	82.8 (81.6, 84.0)	83.7 (82.5, 84.9)	85.4 (84.2, 86.6)	86.9 (85.7, 88.1)	86.8 (85.7, 88.0)	85.8 (84.6, 87.0)	83.4 (81.9, 84.8)
Year-over-year change		**0.9 (0.3, 1.6)**	1.6 (1.0, 2.3)	**1.5 (0.9, 2.2)**	0.0 (−0.6, 0.6)	**−1.1 (−1.7, −0.5)**	**−2.4 (−3.4, −1.4)**
BMI screen							
Overall	52.6 (50.0, 55.2)	56.2 (53.6, 58.7)	60.0 (57.4, 62.5)	61.5 (59.0, 64.1)	67.9 (65.4, 70.5)	70.7 (68.2, 73.2)	65.4 (62.5, 68.4)
Year-over-year change		**3.6 (2.4, 4.8)**	**3.8 (2.6, 5.0)**	**1.6 (0.4, 2.7)**	**6.4 (5.3, 7.5)**	**2.7 (1.7, 3.8)**	**−5.3 (−7.1, −3.4)**
Depression screen							
Overall	39.3 (36.3, 42.2)	50.0 (47.1, 52.8)	59.7 (56.9, 62.6)	65.4 (62.6, 68.3)	69.1 (66.3, 72.0)	71.1 (68.3, 74.0)	64.9 (61.6, 68.3)
Year-over-year change		**10.7 (9.3, 12.2)**	**9.8 (8.4, 11.2)**	**5.7 (4.3, 7.0)**	**3.7 (2.4, 5.0)**	**2.0 (0.7, 3.3)**	**−6.2 (−8.3, −4.1)**
Aspirin use							
Overall	78.3 (77.1, 79.6)	78.6 (77.4, 79.9)	79.3 (78.0, 80.5)	79.4 (78.1, 80.6)	81.5 (80.3, 82.7)	81.5 (80.2, 82.7)	79.4 (77.9, 80.8)
Year-over-year change		0.3 (−0.3, 1.0)	0.6 (0.0, 1.3)	0.1 (−0.5, 0.7)	**2.1 (1.5, 2.7)**	0.0 (−0.6, 0.6)	**−2.1 (−3.0, −1.1)**

Note: Boldface indicates statistical significance ($p<0.05$).
Adjusted for the proportion White, Black, Hispanic, Asian, urban/rural status, ≤100% of the federal poverty level, uninsured, Medicaid insured, Medicare or dually insured (2014 was Medicare only), privately insured, other publicly insured, male, patients without homes, with Community Health Center funding, with Migrant Health Center funding, with Health Care for the homeless funding, and with public housing primary care funding.

Table 3. Adjusted Differentials in Covariates From 2019 to 2020

Proportions	Colorectal cancer screening	Cervical cancer screening	Tobacco cessation	BMI screen	Depression screening	Aspirin use
Age 18–64 years						
Low (≤58.2%)[a]	ref	ref	ref	ref	ref	ref
Medium (58.2%–67.3%)	−1.4 (−4.2, 1.4)	−1.4 (−4.1, 1.3)	0.2 (−1.8, 2.3)	−2.3 (−6.1, 1.4)	0.4 (−3.6, 4.5)	−0.9 (−2.8, 1.0)
High (≥67.3%)	−1.9 (−4.7, 0.9)	−1.7 (−4.4, 1.0)	−2.1 (−4.1, 0.0)	−3.2 (−7.0, 0.6)	1.0 (−3.1, 5.0)	−0.3 (−2.2, 1.5)
Location						
Urban	**−3.4 (−5.7, −1.2)**	**−2.9 (−5.1, −0.8)**	−0.8 (−2.4, 0.9)	−1.8 (−4.9, 1.3)	**−3.5 (−6.8, −0.2)**	0.1 (−1.4, 1.7)
Rural	ref	ref	ref	ref	ref	ref
White						
Low (≤21.2%)	ref	ref	ref	ref	ref	ref
Medium (21.2%–55.4%)	**3.8 (1.3, 6.3)**	2.1 (−0.4, 4.5)	−0.1 (−2.0, 1.7)	0.7 (−2.8, 4.1)	3.1 (−0.6, 6.8)	−0.3 (−2.0, 1.4)
High (≥55.4%)	**4.5 (2.0, 7.1)**	**2.8 (0.3, 5.3)**	1.0 (−1.0, 2.9)	3.2 (−0.4, 6.7)	3.6 (−0.2, 7.4)	−0.4 (−2.3, 1.4)
Black						
Low (≤2.5%)	ref	ref	ref	ref	ref	ref
Medium (2.5%–20.2%)	−2.1 (−4.7, 0.5)	−0.5 (−3.0, 2.0)	1.0 (−0.9, 2.9)	2.4 (−1.1, 5.9)	2.8 (−1.0, 6.6)	0.8 (−1.0, 2.5)
High (≥20.2%)	−1.2 (−3.9, 1.4)	−1.1 (−3.7, 1.4)	−1.3 (−3.2, 0.7)	−3.2 (−6.8, 0.3)	−1.6 (−5.5, 2.2)	1.0 (−0.8, 2.8)
Hispanic						
Low (<6.9%)	ref	ref	ref	ref	ref	ref
Medium (≥6.9%–32.2%)	−0.3 (−3.0, 2.4)	−0.9 (−3.6, 1.7)	−0.1 (−2.1, 1.9)	−1.0 (−4.7, 2.8)	−2.4 (−6.4, 1.7)	−1.3 (−3.2, 0.6)
High (≥32.2%)	**−3.7 (−6.4, −1.0)**	−2.4 (−5.0, 0.2)	0.6 (−1.4, 2.7)	−0.4 (−4.1, 3.4)	−1.5 (−5.5, 2.6)	−1.0 (−2.9, 0.9)
Asian						
Low (≤0.5%)	ref	ref	ref	ref	ref	ref
Medium (0.5%–14.6%)	−0.4 (−3.3, 2.5)	−0.2 (−3.0, 2.7)	0.2 (−2.0, 2.3)	1.8 (−2.2, 5.7)	−1.0 (−5.2, 3.3)	−0.6 (−2.6, 1.4)
High (≥14.6%)	−1.8 (−4.6, 1.0)	−0.9 (−3.6, 1.8)	−1.5 (−3.6, 0.5)	−0.2 (−3.9, 3.6)	−2.7 (−6.8, 1.3)	−1.3 (−3.2, 0.6)
At or below 100 FPL						
Low (≤59.4%)	ref	ref	ref	ref	ref	ref
Medium (59.4%–75.8%)	−2.1 (−4.7, 0.4)	−1.6 (−4.1, 0.8)	−0.9 (−2.8, 1.0)	−1.7 (−5.2, 1.8)	−2.2 (−6.0, 1.5)	1.1 (−0.7, 2.9)
High (≥75.8%)	**−3.2 (−6.0, −0.5)**	−2.5 (−5.2, 0.0)	−0.1 (−2.1, 1.9)	**−4.6 (−8.3, −0.9)**	**−4.0 (−8.0, −0.1)**	0.7 (−1.2, 2.5)
Uninsured						
Low (≤15.5%)	ref	ref	ref	ref	ref	ref
Medium (15.5%–29.4%)	**−3.9 (−6.5, −1.3)**	**−2.5 (−5.0, −0.1)**	−1.3 (−3.2, 0.5)	0.0 (−3.5, 3.5)	−2.9 (−6.7, 0.8)	−0.9 (−2.6, 0.9)
High (≥29.4%)	**−3.0 (−5.6, −0.3)**	−1.4 (−4.0, 1.1)	−1.4 (−3.4, 0.5)	−0.2 (−3.8, 3.5)	0.9 (−2.9, 4.8)	−0.7 (−2.5, 1.1)
Medicaid						
Low (≤32.6%)	ref	ref	ref	ref	ref	ref
Medium (32.6%–53.5%)	−1.7 (−4.3, 1.0)	−1.8 (−4.4, 0.7)	0.4 (−1.5, 2.4)	−2.2 (−5.8, 1.3)	**−4.5 (−8.3, −0.6)**	−0.5 (−2.3, 1.3)
High (≥53.5%)	−1.8 (−4.5, 1.0)	−2.0 (−4.7, 0.6)	0.4 (−1.6, 2.5)	−1.9 (−5.6, 1.8)	**−4.2 (−8.2, −0.2)**	0.4 (−1.5, 2.3)
Medicare[b]						

(*continued on next page*)

Table 3. Adjusted Differentials in Covariates From 2019 to 2020 (*continued*)

Proportions	Colorectal cancer screening	Cervical cancer screening	Tobacco cessation	BMI screen	Depression screening	Aspirin use
Low (≤8.8%)	ref	ref	ref	ref	ref	ref
Medium (8.8%–16.2%)	0.1 (−2.8, 2.9)	0.8 (−2.0, 3.5)	−0.8 (−2.9, 1.3)	−3.0 (−6.9, 0.8)	−2.3 (−6.4, 1.8)	0.2 (−1.8, 2.1)
High (≥16.2%)	2.5 (−0.3, 5.2)	**2.9 (0.3, 5.5)**	1.1 (−0.9, 3.1)	−1.1 (−4.8, 2.6)	0.0 (−4.0, 4.0)	−0.1 (−2.0, 1.8)
Private						
Low (≤12.8%)	ref	ref	ref	ref	ref	ref
Medium (12.8%–23.9%)	1.8 (−0.9, 4.5)	2.5 (−0.1, 5.1)	0.5 (−1.5, 2.5)	−0.6 (−4.3, 3.1)	0.4 (−3.6, 4.4)	0.2 (−1.6, 2.1)
High (≥23.9%)	**3.8 (1.0, 6.5)**	**3.2 (0.5, 5.9)**	0.4 (−2.4, 1.7)	1.2 (−2.6, 5.0)	1.2 (−2.9, 5.2)	−0.2 (−2.2, 1.7)
Male						
Low (≤41.1%)	ref		ref	ref	ref	ref
Medium (41.1%–44.6%)	−0.7 (−3.3, 1.9)		0.1 (−1.8, 2.0)	−1.8 (−5.3, 1.7)	−1.1 (−4.8, 2.6)	−0.5 (−2.2, 1.3)
High (≥44.6%)	1.8 (−0.9, 4.5)		−0.3 (−2.4, 1.7)	−1.3 (−5.0, 2.4)	−1.3 (−5.2, 2.7)	−0.1 (−2.0, 1.7)
Homeless						
Low (≤0.5%)	ref	ref	ref	ref	ref	ref
Medium (0.5%–3.2%)	−1.5 (−4.5, 1.5)	**−3.3 (−6.1, −0.4)**	−1.2 (−3.4, 1.0)	−1.2 (−5.3, 2.9)	−0.5 (−4.9, 3.8)	−1.4 (−3.4, 0.7)
High (≥3.2%)	−1.1 (−4.1, 1.9)	−2.8 (−5.6, 0.1)	−0.2 (−2.4, 2.0)	−1.2 (−5.3, 2.8)	1.9 (−2.5, 6.2)	−1.0 (−3.0, 1.1)
Funding						
Not CHC funded	−2.4 (−11.9, 7.0)	1.0 (−8.1, 10.1)	−5.0 (−11.9, 1.8)	−10.6 (−23.3, 2.2)	3.7 (−10.0, 17.4)	−2.0 (−8.3, 4.3)
MHC	−2.9 (−6.0, 0.2)	−1.3 (−4.3, 1.7)	0.7 (−1.6, 3.0)	2.7 (−1.5, 6.9)	0.7 (−3.9, 5.2)	−1.0 (−3.2, 1.1)
HO	−0.6 (−3.1, 1.8)	−0.2 (−2.5, 2.1)	0.9 (−0.9, 2.7)	0.1 (−3.2, 3.3)	2.1 (−1.5, 5.6)	−0.1 (−1.7, 1.6)
PH	**−3.6 (−6.9, −0.2)**	**−3.5 (−6.7, −0.4)**	−1.2 (−3.6, 1.3)	−3.4 (−7.9, 1.1)	**−6.8 (−11.6, −2.0)**	**−3.0 (−5.3, −0.6)**

Note: Boldface indicates statistical significance ($p<0.05$).
Adjusted for the proportion White, Black, Hispanic, Asian, urban/rural status, ≤100% of the FPL, uninsured, Medicaid insured, Medicare or dually insured (2014 was Medicare only), privately insured, other publicly insured, male, patients without homes, with CHC funding, with MHC funding, with HO funding, and PH.
CHC, Community Health Center; FPL, Federal Poverty Level; HO, Health Care for the Homeless; MHC, Migrant Health Center; PH, Public Housing Primary Care.
[a]Ranges for ranked tertiles did not overlap, but the limits between ranks were less than the hundredths decimal in some cases.
[b]Medicare or dually eligible (2014 Medicare only).

this study is the aspect of periodicity, specifically for estimates of UTD colorectal cancer, cervical cancer, and tobacco screening and cessation counseling, which are recommended at intervals of >1 year. A decline in these outcomes is concerning given the periodicity of screening because many remained UTD without receiving screening during the measurement period. In addition, because UTD outcomes are most relevant for the prevention and early detection of cancer and other chronic disease outcomes, renewed efforts are needed to ensure that the observed screening measures do not translate to a sustained decline in lost screenings as the pandemic progresses.

Despite these findings, it is important to note that CHCs provide high-quality care and have been under enormous pressure to care for their patients and communities amidst the rapidly evolving COVID-19 landscape. In fact, there has been evidence to suggest that colorectal cancer screening has been steadily improving, whereas cervical cancer screening has remained constant in CHCs before the pandemic.[20] CHCs also played a critical role in providing high-quality pandemic care to low-income patients.[4] At a peak week in January to May 2020, 67% of CHC visit volumes were for COVID-19 cases, leaving little room for preventive services during this time.[4] In addition, pandemic onset spurred new quality improvement interventions in individual CHCs and networks, including cancer screening modality changes, telehealth adoption, and patient outreach.[3,21−24] The extent to which these interventions mitigated large-scale disruptions in care among CHCs nationally is unknown, but preliminary evidence suggests that care has been rebounding after initial disruption in health settings.[25] Nonetheless, this study indicates that the pandemic was potentially associated with nationwide care disruptions that reversed previous trends in preventive services, which previously matched national targets,[18,19] as well as cancer screenings that were consistently lower than national estimates but were on an upward trajectory.[15,20] These findings highlight the need for broad-based interventions across CHCs nationally, and these efforts would be well served by building on the evidence base generated from interventions implemented during the pandemic, which have successfully improved care delivery.

Larger declines were found for clinics with high proportions of patients who were disproportionally impacted by the pandemic, such as Hispanic patients and those with lower SES. Declines in colorectal cancer screening during the COVID-19 pandemic were particularly steep among CHCs with relatively high proportions of Hispanic persons. CHCs have historically documented large disparities for Hispanic persons in diabetes control and colorectal cancer screening.[26,27] Meanwhile, declines in colorectal and cervical cancer screening were not as drastic for clinics with higher proportions of White persons. The present results suggest that the pandemic may have been disproportionately associated with preventive care among CHCs that serve Hispanic patients. Given that Hispanic patients have relatively higher rates of chronic disease burden, targeted approaches are necessary to address these declines for CHCs with large Hispanic populations. Optimal utilization of electronic health records and data capabilities along with patient-centered medical home recognition and insurance coverage through Medicaid expansion may have contributed to improvements in diabetes control for Hispanic persons in CHCs.[28] These improvements were most notable 5 years after state Medicaid expansion and may be related to improved financial revenues in CHCs that could expand service capacity.[28] These and other interventions could potentially be further expanded to address disparities that emerged during the COVID-19 pandemic.

Proceeding with the narrative that persons most impacted by the COVID-19 pandemic experienced the greatest disruptions to care, clinics with higher proportions of uninsured patients, patients at or below 100% of the FPL, and patients without homes and clinics receiving PH funding provided for clinics immediately accessible to public housing sites[8] experienced higher declines in clinical quality measures. CHCs with relatively high proportions of uninsured patients had the greatest declines in colorectal and cervical cancer screening. This is consistent with previous literature that found that clinics with high proportions of uninsured patients were less likely to be in top-performing sites for some clinical quality measures.[29] Meanwhile, clinics with higher proportions of privately insured patients experienced less drastic declines. Consistent with previous literature, CHCs with relatively high proportions of patients at or below 100% of the FPL had the lowest colorectal cancer screening, BMI screening and follow-up, and depression screening and follow-up rates.[27] CHCs with greater proportions of patients without homes or PH-funded sites experienced additional declines in colorectal and cervical cancer screening, depression screening and follow-up, and aspirin use for IVD.[8] In a recent study of patients without homes in Oklahoma, 64% were overweight or obese, and 79% used tobacco, along with multiple other negative risk factors.[30] It is therefore concerning, albeit not surprising, that clinics that specialize in care to individuals without homes and those in or nearby public housing sites experienced drastic declines during the pandemic. This study's findings support the need for pandemic preparedness with bolstered public health

infrastructure and ongoing support and resources for CHCs to be able to rapidly respond to urgent needs in their communities while also maintaining necessary preventive care services and chronic disease management. In addition, the role of social deprivation indices and community-level factors for clinical quality measures must be investigated because CHCs serving minority groups may have been more likely to shift their resources to pandemic-related care.

Limitations

Although care has been rebounding nationally since the beginning of the pandemic, it is not possible to determine whether this was the case in CHCs nationwide until additional years of the UDS data are released. Nor was it possible to assess whether increased COVID-19 rates in CHC areas were associated with decreases in the provision of preventive care because addresses for each clinic within a CHC were not provided. In addition, clustering by state prevented state-level analysis. The UDS does not allow for analysis by month, so January and February 2020 are included as part of the pandemic, despite pandemic orders not going into effect in the U.S. until March 2020.[5] The UDS only includes data for patients who received care each year and therefore was not able to account for patients falling out of care or who did not receive it within the calendar year reporting period. In addition, temporary CHC closures related to COVID-19 were not specifically documented in the UDS data, which may underestimate the vulnerable population needing care. However, the mean number of patients per clinic only dropped from 21,543 in 2019 to 20,793 in 2020. A sensitivity analysis was run on all clinical quality measures with a cohort of clinics that had data available for both 2019 and 2020, and the results were largely unchanged from those of the main results.

CONCLUSIONS

Unique declines in all clinical quality measures that diverged from previous trends indicated pandemic-related disruptions in care within CHCs. As practices adapted to the pandemic, there may be evidence of preventive services rebounding more recently.[25] However, gaps may persist unless screening rebounds are high enough to mitigate these declines.[6] As more years of data are released, future studies to assess interventions that reduce disruptions in the care provided by CHCs will be helpful, as has already been done in individual safety-net hospitals.[22] An additional area for future research includes state-level analysis of CHCs with increased area rates of COVID-19. Efforts to improve long-term health outcomes of underserved groups also need to comprehensively address pandemic-related reductions in clinical quality measures in primary care delivered in CHCs that have high proportions of Hispanic patients, uninsured patients, patients in poverty, patients without homes, and clinics accessible to public housing.

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SUPPLEMENTAL MATERIAL

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