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# The Maryland Health Enterprise Zone Initiative Reduced Hospital Cost And Utilization In Underserved Communities

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**ABSTRACT** The State of Maryland implemented the Health Enterprise Zone Initiative in 2013 to improve access to health care and health outcomes in underserved communities and reduce health care costs and avoidable hospital admissions and readmissions. In each community the Health Enterprise Zone Initiative was a collaboration between the local health department or hospital and community-based organizations. The initiative was designed to attract primary care providers to underserved communities and support community efforts to improve health behaviors. It deployed community health workers and provided behavioral health care, dental services, health education, and school-based health services. We found that the initiative was associated with a reduction of 18,562 inpatient stays and an increase of 40,488 emergency department visits in the period 2013–16. The net cost savings from reduced inpatient stays far outweighed the initiative's cost to the state. Implementing such initiatives is a viable way to reduce inpatient admissions and reduce health care costs.

**H**ealth disparities continue to be a problem in the United States. Disparities in health outcomes are due in part to inadequate access to medical care and poor health behaviors; they are also associated with social and environmental risk factors.<sup>1–5</sup> Previous studies have shown that multicomponent community-based interventions can be effective in improving access to care and health outcomes.<sup>6,7</sup> The Health Enterprise Zone Initiative is a program created and implemented by the State of Maryland to address health and health care disparities among residents who are members of minority groups or have low socioeconomic status living in medically underserved areas by improving their access to care and providing services that improve their health behaviors.<sup>8</sup> The initiative provided support to coalitions of health departments, other local government agencies, health care providers, and communi-

ty-based social services organizations in working together to address health care needs in a designated underserved community.

Although there was a great deal of programmatic variation among the Health Enterprise Zones, the primary elements of the initiative included recruiting primary care physicians to underserved areas, recruiting and deploying community health workers, improving care coordination, providing health education and screening, and increasing access to both health services and relevant social services. Each Health Enterprise Zone was configured to meet its community's unique combination of barriers to access to care, health problems faced in the zone, and availability of community-based services.

There is evidence that programs such as the initiative have the potential to improve access to care and health outcomes. The initiative's design is similar to that of the recent Accountable Health Communities Model of the Centers for

Medicare and Medicaid Services (CMS). That model addresses health-related social needs by linking health services providers and the community to improve health outcomes and reduce cost.<sup>9</sup> Like the Health Enterprise Zone Initiative, the goal of Accountable Health Communities was to build capacity within a community to address residents' health-related needs.<sup>10</sup> Another model, Hennepin Health in Minnesota, was a community-based intervention that combined health care and social services. A study found that Hennepin Health shifted care from the hospital to the outpatient care setting and improved the quality of care for people with chronic conditions.<sup>11</sup> In addition, several studies evaluating the impact of community health worker interventions on disease management and health outcomes found that community health worker programs enhanced patients' self-management and improved their quality of life.<sup>12-14</sup> There is also evidence that approaches involving tax incentives, grants, loans, technical assistance, job training, and community services have been effective in addressing health and social issues.<sup>3,7</sup>

Two goals that Maryland policy makers had for the Health Enterprise Zone Initiative were to reduce health care costs and to reduce potentially avoidable hospital admissions and readmissions in the five Health Enterprise Zone communities. This study examined whether the initiative was associated with reductions in hospital use.

## Description Of The Initiative

Contiguous geographic communities, defined by ZIP code boundaries, with populations of at least 5,000 people who demonstrated economic disadvantage and poor health outcomes were eligible to apply for the Health Enterprise Zone Initiative.<sup>15</sup> Specifically, a ZIP code was eligible if its Medicaid enrollment rate was above the median for all Maryland ZIP codes or its Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participation rate was above the median for all Maryland ZIP codes. Additional eligibility requirements stipulated that the ZIP code have a life expectancy below the state median or percentage of low-birthweight infants above the state median. In October 2012 nineteen Health Enterprise Zone applications were submitted by local health departments, hospitals, or community-based nonprofit organizations from seventeen jurisdictions in Maryland.<sup>16</sup> In January 2013 the Maryland Community Health Resources Commission and the Maryland Department of Health designated five geographic areas as Health Enterprise Zones: Annapolis/Morris Blum, in Anne Arundel Coun-

ty; Capitol Heights, in Prince George's County; Caroline and Dorchester Counties; Greater Lexington Park, in St. Mary's County; and West Baltimore, in Baltimore City.<sup>3</sup> In three of the zones (Annapolis/Morris Blum, Greater Lexington Park, and West Baltimore), hospital systems led the effort, while the other two (Capitol Heights and Caroline and Dorchester Counties) were led by the local health departments. The five zones varied in population density—one urban, two suburban, and two rural.<sup>15</sup>

The state provided each zone with resources and incentives to attract private health care practitioners to medically underserved communities. The lead organization received the funds and subcontracted with partners in its coalition to provide an array of services to residents of the zone, specifically targeting diabetes, cardiovascular disease-related illnesses, asthma, obesity, and behavioral health problems. (See online appendix exhibit S1 for a description of each zone.)<sup>17</sup> The resources and incentives included grant funding from the Community Health Resources Commission, priority for entering Maryland's multipayer Patient Centered Medical Home Program, loan repayment assistance, and tax credits for income and hiring. The zones used these resources to, for example, open new community health centers; operate mobile medical, mental health, and dental care units; deploy community health workers; implement healthy food programs; and offer school-based services. In addition, the initiative encouraged leaders of local health care and social service organizations to work together to address the health needs of residents in their communities.

## Study Data And Methods

**DATA SOURCES** The primary data sources for this study were hospital inpatient stay and emergency department (ED) visit data for 2009–16 from the Maryland Health Services Cost Review Commission and hospital readmissions data for 2012–15 from the Chesapeake Regional Information System for our Patients.<sup>18,19</sup> These data contain a census of inpatient and ED use by Maryland residents in Maryland hospitals. We obtained ZIP code-level Medicaid enrollment data for 2009–16 from the Maryland Medicaid program through the Hilltop Institute at the University of Maryland, Baltimore County. We combined these data with publicly available sociodemographic data from the 2010 US census and from the 2010–14 American Community Survey. We used those five years of survey data to compute reliable estimates of the composition of each ZIP code's population by age, race/ethnicity, poverty status, median household income,

educational attainment, employment status, household composition, and marital status, as well as the occupancy rate of homes in each ZIP code.<sup>20</sup>

**OUTCOMES** ZIP codes were our primary unit of analysis. There are 458 ZIP codes in Maryland. Health care providers and community-based organizations serving residents in 110 ZIP codes were eligible for Health Enterprise Zone funding (see appendix exhibit S2).<sup>17</sup> We compared adult hospital utilization rates in Health Enterprise Zone-awarded communities located in sixteen ZIP codes with rates in Health Enterprise Zone-eligible communities located in ninety-four ZIP codes. For each ZIP code, we computed the number of inpatient stays, readmissions, and ED visits per 1,000 residents for each study year. We excluded inpatient stays and ED visits with a diagnosis of cancer, trauma, injury, normal delivery, or delivery with complications because the initiative did not target these conditions. We computed utilization rates for subsets of inpatient stays and ED visits for specific conditions as defined by Prevention Quality Indicators and Health Enterprise Zone-related conditions. We used the Agency for Healthcare Research and Quality's Prevention Quality Indicator composite measure, which includes the following conditions: short- and long-term diabetes, perforated appendix, chronic obstructive pulmonary disease (COPD) or asthma in older adults, hypertension, heart failure, dehydration, bacterial pneumonia, urinary tract infection, uncontrolled diabetes, asthma in younger adults, and lower extremity amputation among patients with diabetes.<sup>21</sup> As stated above, Health Enterprise Zone-related conditions are diabetes, cardiovascular disease-related illnesses, asthma, obesity, and behavioral health problems; for this study, we included inpatient stays or ED visits with a primary diagnosis of one of those conditions.

To estimate the economic impact of the initiative, for each ZIP code we calculated charges per 1,000 residents for inpatient stays and ED visit outcomes. This entailed summing the allowable charge amounts for every inpatient stay or ED visit by ZIP code and dividing by the population by 1,000. Because Maryland is an all-payer state, charges measure what insurers (including Medicare and Medicaid) and patients pay for hospital services.

**STATISTICAL ANALYSIS** We conducted a multivariate difference-in-differences analysis to determine whether implementation of the Health Enterprise Zone Initiative was associated with changes in hospital use.<sup>22</sup> Given that the zones required time to fully implement their programs once they were awarded funds in 2013, we used a

dummy variable to indicate that a ZIP code was in a community that had been awarded funds and interacted it with dummy variables for the application year (2012) and each implementation year (2013, 2014, 2015, and 2016). This allows the estimate of the impact of the initiative to vary over time. Preliminary analyses showed that there were no significant differences between the ZIP codes in the pre-implementation period. The interactions for 2010 and 2011 were not significantly different from the interaction with 2009 ( $p > 0.10$ ). We expected the coefficients on the pre-implementation interaction terms to be nonsignificant and those on the implementation interaction terms to be significant. Readmission data were not available for years before 2012. Therefore, for this outcome, 2012 was used as the reference year to compare changes in readmissions during the implementation period of 2013–16.

We estimated these linear regression models using both fixed and random effects. The fixed-effects models included annual Medicaid enrollment in each ZIP code. In the random-effects models, we added ZIP code-level control variables for demographic and socioeconomic characteristics. Hausman tests consistently rejected the null hypothesis that the random-effects models were more efficient. Therefore, we report the results from the fixed-effects models only. (See appendix exhibit S3 for random-effects results.)<sup>17</sup>

We used the coefficients on the zone-year interaction terms from the fixed-effects models to estimate the impact of the initiative on inpatient stays, inpatient charges, ED visits, and ED charges. To calculate the total change in stays, visits, and charges, we multiplied these coefficients by the population in the ZIP codes where Health Enterprise Zone funds had been awarded. We converted the charges to 2016 dollars using the Consumer Price Index for Medical Care. The regression models were weighted by the ZIP code population and estimated using Stata, version 14.

**QUALITATIVE INTERVIEWS** To provide context for the quantitative findings, we conducted structured interviews with thirty-one residents and twenty-one health care providers (including physicians, nurse practitioners, pharmacists, and care coordinators) and focus groups with eighteen residents from the five Health Enterprise Zones. We asked participants how the initiative had affected access to care and health behaviors for residents of the zones.

**SENSITIVITY ANALYSES** As a sensitivity analysis, we estimated semi-log models because the outcome variables are skewed. The results were consistent with those of our main analysis. The

coefficients had the same sign but were not significant. However, the linear models had more explanatory power than the semi-log models (see appendix exhibit S4).<sup>17</sup> Finally, we estimated the models using ZIP codes not eligible to participate in the initiative as the comparison group (see appendix exhibit S5).<sup>17</sup>

To test the robustness of our findings, we conducted falsification tests.<sup>23</sup> We explored the impact of the Health Enterprise Zone Initiative on inpatient stays and ED visits for marker conditions that are not sensitive to timely ambulatory care (appendicitis/appendicitis with appendectomy, gastrointestinal obstruction, and fracture of the hip or femur)<sup>24,25</sup> and for pregnancy, childbirth, or the puerperium. By definition, we did not expect the initiative to have an impact on the marker and pregnancy conditions.

**LIMITATIONS** The study had some limitations. First, the analysis included the hospital use of all residents in the Health Enterprise Zone ZIP codes, including residents who did not actively participate in the initiative. Second, we did not observe hospital use by residents of neighboring jurisdictions.

Third, we did not have data on nonemergency outpatient visits and ambulatory care services. Care may have shifted from relatively costly inpatient settings to less expensive outpatient and ambulatory care settings. Also, the Health Enterprise Zone Initiative may have encouraged new episodes of care, with residents using additional nonemergency outpatient and ambulatory care services. The costs of these services could partially offset associated reductions in charges for inpatient care.

Fourth, we did not control directly for two programs that were implemented during the study period: Maryland's All-Payer Global Budget Cap Model in 2014 and CareFirst Blue-Cross BlueShield's Patient-Centered Medical Home Program in 2011. Lastly, the findings of this study might not be generalizable because Maryland has an all-payer global budget payment program; this structure creates an incentive in the hospital industry that is not typical in other states.<sup>26-28</sup>

## Study Results

**DEMOGRAPHICS AND PAYER MIX** Compared to the ZIP codes that were eligible to participate in the Health Enterprise Zone Initiative but did not receive awards, ZIP codes that received Health Enterprise Zone awards had higher percentages of black residents, lower socioeconomic status, lower marriage rates, and higher percentages of vacant homes (exhibit 1). The payer mix of the two groups of ZIP codes also varied (data not

shown). In 2016 a higher percentage of hospital use was covered by Medicaid in awarded ZIP codes (56.6 percent versus 43.7 percent for ED visits, and 38.8 percent versus 28.9 percent for inpatient stays) than in eligible ZIP codes. This gap was completely offset by differences in the percentages of ED visits and inpatient stays cov-

### EXHIBIT 1

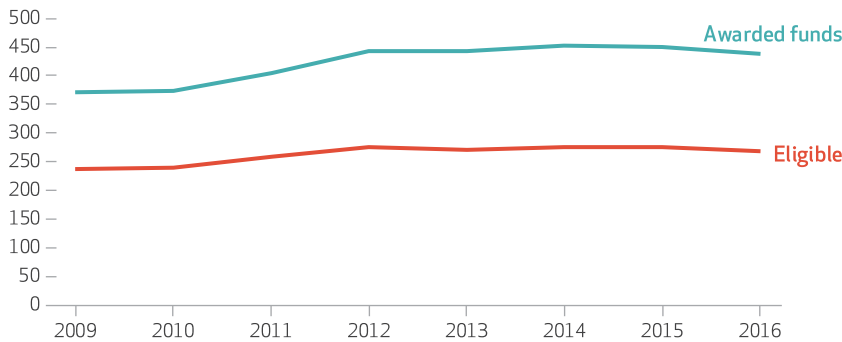
**Selected characteristics of ZIP codes that were eligible for or awarded funds from the Health Enterprise Zone Initiative in Maryland**

	Awarded funds (n = 16)	Eligible (n = 94)	p value
Mean population	17,580.4	26,196.4	0.048
Race/ethnicity			
White	29.2%	42.5%	0.150
Black	62.1	39.7	0.029
Asian	1.6	4.3	<0.001
Native American/other	2.4	2.9	0.230
Hispanic	4.6	10.6	0.002
Age range (years)			
0-17	23.3%	22.8%	0.649
18-24	10.1	10.1	0.996
25-44	26.1	29.0	0.012
45-64	26.8	25.8	0.072
65-79	9.8	8.8	0.205
80 or more	3.6	3.3	0.513
Income distribution (percent of FPL)			
0-99	21.0	13.6	0.048
100-124	4.4	3.5	0.207
125-149	5.1	3.8	0.051
150-174	5.3	4.1	0.097
175-184	1.7	1.7	0.774
185-199	2.7	2.5	0.536
200 or more	63.5	74.1	0.043
Median household income	\$49,989	\$60,564	0.141
Employment status			
Unemployed	8.6%	6.6%	0.072
Employed	54.0	61.6	0.004
Not in the labor force	36.9	31.4	0.016
Highest level of education			
No high school	4.9%	6.0%	0.224
Some high school	13.0	8.8	0.017
Finished high school	32.5	30.0	0.304
Some college	22.2	20.8	0.237
Associate's degree	5.4	6.3	0.017
College degree	12.9	16.3	0.147
Advanced degree	9.0	11.8	0.240
Marital status			
Married	32.2%	40.5%	0.040
Never married	45.3	39.5	0.104
Widowed	7.1	6.1	0.019
Separated	4.0	3.2	0.049
Divorced	11.4	10.8	0.149
Homes			
Occupied	81.3%	90.0%	0.021
Vacant	18.7	9.9	0.021

**SOURCE** Authors' analysis of data for 2010 from the Decennial Census of Population and Housing and for 2010-14 from the American Community Survey. **NOTES** Eligibility for the initiative is explained in the text. Percentages were weighted by the ZIP code population. FPL is federal poverty level.

**EXHIBIT 2**

**Numbers of emergency department visits per 1,000 residents of ZIP codes that were eligible for or awarded funds from the Health Enterprise Zone Initiative in Maryland, 2009-16**



**SOURCE** Authors' analysis of hospital utilization data for 2009-16 from the Maryland Health Services Cost Review Commission. **NOTES** Eligibility for the initiative, which was implemented in 2013, is explained in the text. Visits for childbirth, trauma, or cancer were excluded. Results were weighted by the ZIP code population.

ered by commercial insurance. Medicare covered similar percentages of ED visits and inpatient stays (about 16 percent and 43 percent, respectively) in awarded ZIP codes compared to eligible ZIP codes.

**EMERGENCY DEPARTMENT VISITS AND HOSPITAL STAYS** The awarded ZIP codes had higher rates of hospital ED visits and inpatient stays than eligible ZIP codes did (exhibits 2 and 3). ED visits per 1,000 residents rose from 2010 to 2012 and then flattened out in both groups of ZIP codes. Inpatient stays per 1,000 residents declined in both groups of ZIP codes throughout the study period, although the difference between the two groups narrowed over time.

Exhibit 4 presents coefficients from the fixed-

effects difference-in-differences model, which estimate the effects of the Health Enterprise Zone Initiative on emergency department visits and inpatient stays. There is evidence that the Health Enterprise Zone Initiative was associated with a reduction in numbers of inpatient stays and an increase in numbers of ED visits throughout the study period. For example, the initiative was associated with a reduction of 13.73 inpatient stays per 1,000 residents in 2013, which increased to a reduction of 18.03 in 2014. The magnitude of the estimates was similar for 2015 and 2016 (reductions of 16.76 and 17.47, respectively). The findings were stronger for stays related to Prevention Quality Indicators or conditions targeted by the initiative: For the former, inpatient stays had decreases ranging from 3.43 in 2013 to 10.84 in 2016, and readmissions had decreases ranging from 1.33 in 2013 to 3.78 in 2016. The estimates for Health Enterprise Zone-related (targeted) conditions showed decreases as well.

The initiative was associated with increases in ED visits per 1,000 residents of 32.40 in 2013, 41.01 in 2014, 38.78 in 2015, and 31.75 in 2016. It was also associated with increases in ED visits for conditions related to the Prevention Quality Indicators and targeted by the initiative.

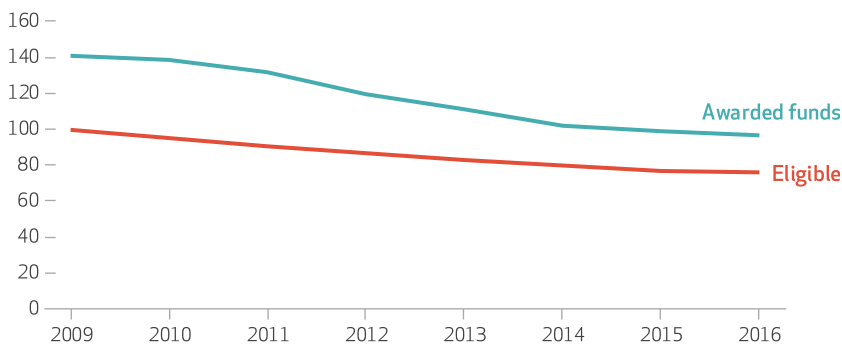
**EMERGENCY DEPARTMENT AND HOSPITAL INPATIENT CHARGES** The pattern for charges per 1,000 residents was similar to that observed for inpatient stays and ED use (exhibit 4). For inpatient stay charges, the initiative was associated with a reduction of \$149,997 in 2013, \$125,308 in 2014, \$166,764 in 2015, and \$156,593 in 2016. Conversely, for ED visit charges, it was associated with an increase of \$48,702 in 2013. The pattern from 2013 to 2016 is an inverted U shape, rising to \$63,553 in 2014 and falling back to \$46,301 in 2016.

The random-effects models yielded results similar to those of the fixed-effects models, and all but one of the coefficients were significant (appendix exhibit S3).<sup>17</sup> The estimate using ZIP codes not eligible for the initiative as the comparison group also yielded similar results. The estimated reduction in inpatient stays tended to be larger and was always significant (see appendix exhibit S5).<sup>17</sup>

For our falsification tests, we explored the impact of the initiative on inpatient stays for the marker and pregnancy-related conditions. First, for the marker conditions, we expected to see no difference in the number of inpatient stays and ED visits per 1,000 residents after the initiative was implemented; indeed, we found that implementation was not associated with such a change (exhibit 4). The results were similar for the pregnancy-related conditions, with the exception of

**EXHIBIT 3**

**Numbers of inpatient stays per 1,000 residents of ZIP codes that were eligible for or awarded funds from the Health Enterprise Zone Initiative in Maryland, 2009-16**



**SOURCE** Authors' analysis of hospital utilization data for 2009-16 from the Maryland Health Services Cost Review Commission. **NOTES** Eligibility for the initiative, which was implemented in 2013, is explained in the text. Stays for childbirth, trauma, or cancer were excluded. Results were weighted by the ZIP code population.

**EXHIBIT 4**
**Estimated differences in emergency department (ED) visits and inpatient stays and in charges, per 1,000 residents, between ZIP codes that received funds and those that were eligible for funds from the Health Enterprise Zone Initiative in Maryland, 2013–16**

	2013	2014	2015	2016
<b>EMERGENCY DEPARTMENT VISITS</b>				
All visits				
Number	32.40***	41.01***	38.78**	31.75***
Charges	\$48,702**	\$63,554**	\$54,501**	\$46,301**
PQI-related visits				
Number	6.05***	5.15*	5.71***	2.89
Charges	\$9,663**	\$9,429**	\$11,138**	\$7,252**
Targeted condition visits				
Number	4.21*	7.16**	6.31*	3.53*
Charges	\$8,231*	\$14,933**	\$13,418**	\$7,987**
<b>INPATIENT STAYS</b>				
All stays				
Number	-13.73***	-18.03**	-16.76*	-17.47*
Charges	-\$149,997***	-\$125,308	-\$166,764*	-\$156,593**
PQI-related stays				
Number	-3.43***	-4.26***	-3.56**	-10.84****
Charges	-\$35,334**	-\$28,729	-\$31,114*	-\$44,340*
Targeted condition stays				
Number	-1.79*	-3.37**	-3.54*	-5.16*
Charges	-\$20,372*	-\$19,626	-\$29,949*	-\$47,908*
Readmissions <sup>a</sup>				
Number	-1.33*	-2.87**	-2.31*	-3.78*
<b>FALSIFICATION TEST RESULTS</b>				
Marker conditions				
ED visits	-0.12	-0.12	-0.11	-0.11
Inpatient stays	-0.03	0.08	0.05	0.14
Pregnancy-related conditions				
ED visits	-1.93	-1.11	-1.10	-2.30
Inpatient stays	-0.03	-0.58	-0.85**	-0.88**

**SOURCE** Authors' analysis of data for 2010 from the Decennial Census of Population and Housing, for 2010–14 from the American Community Survey, for 2009–16 from the Maryland Health Services Cost Review Commission, and for 2012–16 from the Chesapeake Regional Information System for our Patients (CRISP). **NOTES** Results are expressed as coefficients from fixed-effects difference-in-differences models. Eligibility for the initiative is explained in the text. Charges were adjusted for inflation to 2016 dollars. Marker conditions (listed in the text) are not sensitive to timely ambulatory care. Pregnancy-related includes pregnancy, childbirth, and the puerperium. PQI is Prevention Quality Indicators of the Agency for Healthcare Research and Quality. <sup>a</sup>We did not have charge data for readmissions. \* $p < 0.10$  \*\* $p < 0.05$  \*\*\* $p < 0.01$  \*\*\*\* $p < 0.001$

significant reductions in inpatient stays for deliveries in 2015 and 2016. The initiative discouraged risky sexual behavior but did not include family planning services. Therefore, we expected to find no difference in deliveries per 1,000 residents associated with its implementation.

**SAVINGS AND PROGRAM COSTS** We compared the net savings in hospital charges to the cost of the program. During 2013–16 the ZIP codes that were awarded funds from the initiative had an increase of 40,488 ED visits, which cost insurers and patients \$59.9 million (exhibit 5). However, this was offset by an overall reduction of 18,562 inpatient stays, which saved insurers and patients \$168.4 million. The state spent \$15.1 million on the initiative in the same period, and combining that amount with the net reduction in charges of \$108.5 million suggests an overall

net savings of \$93.4 million for Maryland's health care system. All five Health Enterprise Zones had net savings. West Baltimore saved the most, \$50.1 million, which compared favorably to \$4.2 million spent there by the state. Annapolis had the greatest return on investment, receiving \$800,000 from the state and saving \$13.1 million.

**QUALITATIVE FINDINGS** The qualitative findings from the structured interviews and focus groups support the quantitative findings reported above. Residents and health care providers indicated that the initiative improved access to care and enabled residents to adopt health behaviors and practices that improved their health outcomes. Residents started becoming aware of their health, exercising more, and monitoring their diets. Providers also felt that

## EXHIBIT 5

Estimated impact of the Maryland Health Enterprise Zone Initiative on emergency department (ED) visits, inpatient stays, and charges, for each zone and all ZIP codes combined that were awarded funds, 2013–16

	Annapolis/ Morris Blum	Dorchester and Caroline Counties	Capitol Heights	Greater Lexington Park	West Baltimore	All ZIP codes
<b>VISITS AND INPATIENT STAYS</b>						
ED visits	5,184	5,036	5,559	4,448	20,261	40,488
Inpatient stays	-2,376	-2,309	-2,549	-2,039	-9,289	-18,562
<b>CHARGES (MILLIONS OF DOLLARS)</b>						
ED visits	\$7.67	\$7.45	\$8.23	\$5.08	\$29.99	\$59.93
Inpatient stays	-\$21.56	-\$20.95	-\$23.12	-\$18.50	-\$84.27	-\$168.39
<b>FINANCIAL IMPACT OF INITIATIVE (MILLIONS OF DOLLARS)</b>						
Cost to the state	\$0.80	\$2.87	\$4.30	\$2.90	\$4.20	\$15.07
Net cost savings	-\$13.09	-\$10.63	-\$10.59	-\$10.52	-\$50.08	-\$93.39

**SOURCE** Authors' analysis of data for 2010 from the Decennial Census of Population and Housing, 2010–14 from the American Community Survey, 2009–16 from the Maryland Health Services Cost Review Commission, and 2012–16 from the Chesapeake Regional Information System for our Patients (CRISP). **NOTE** Charges were adjusted for inflation to 2016 dollars.

the initiative helped patients manage chronic conditions. They highlighted the importance of the provision of preventive services and health education that enabled patients who are often marginalized to improve their health-seeking behavior and be more aware of their health-related issues.

### Discussion

The objective of the study was to examine changes in hospital use and associated health care costs for the five Health Enterprise Zones in Maryland. The results demonstrate that the Health Enterprise Zone Initiative was associated with a reduction in inpatient stays and an increase in ED visits per 1,000 residents, even though two unrelated statewide changes took place at the same time.

The rate of inpatient stays statewide was decreasing in part because a global budget payment model was implemented on January 1, 2014.<sup>28</sup> Under the global budget payment model, all Maryland hospitals are encouraged to decrease potentially avoidable use of care. However, the decrease in inpatient stays observed in the Health Enterprise Zones was even greater than that observed statewide. This may be because the initiative targeted high users of hospital care as well as people with chronic conditions, and it may have helped residents better manage those health conditions—thus reducing the need for inpatient care. Indeed, it is unlikely that our findings can be attributed to the implementing of global budgets. A 2018 study showed that the All-Payer Global Budget Cap Model did not have a consistent impact on hospital use for Medicare beneficiaries.<sup>29</sup> This differs from our finding of

reductions in inpatient stays.

A second change taking place statewide was the CareFirst Patient Centered Medical Home Program. Evaluations of this program found that it reduced hospital inpatient and ED use.<sup>30,31</sup> However, only one of the Health Enterprise Zones had a patient-centered medical home operating in it, and just 16 percent of hospital patients in the zones were covered by commercial insurance. Consequently, the CareFirst Patient Centered Medical Home Program could affect only relatively few residents of Health Enterprise Zone ZIP codes.

Although we found a decrease in inpatient stays when we compared Health Enterprise Zone residents to residents in eligible ZIP codes whose communities were not included in the zones, there was also a relative increase in ED use. The reduction in inpatient stays was consistent with our expectations, but the increase in ED visits was unexpected. One possible explanation is that hospitals were more likely to send ED patients home instead of admitting them because the patients had access to Health Enterprise Zone resources. Another reason for the relative increase in ED use is that the Maryland Health Services Cost Review Commission encouraged hospitals to use observation status instead of short inpatient stays after 2010, which would allow patients to receive observation services (for example, x-rays, lab tests, and medications) in the ED and depress the numbers of inpatient stays. CMS's Two-Midnight rule, which followed a few years later, did the same.<sup>32</sup> However, it is unclear why this would disproportionately affect Health Enterprise Zones. In addition, as a result of the Affordable Care Act, Medicaid enrollment expanded in Maryland, and prior re-

search shows that previously uninsured people increase their ED use when they obtain Medicaid coverage.<sup>33</sup> However, we controlled for Medicaid enrollment in our analysis. While the Health Enterprise Zone–awarded ZIP codes had more Medicaid enrollees than the eligible ZIP codes that did not receive Health Enterprise Zone awards, the expansion increased their Medicaid enrollment by similar proportions.

Our findings are consistent with those of other studies that show that interventions that improve both access to care and health behaviors of underserved populations can result in a significant reduction in their hospital use.<sup>34,35</sup> The initiative improved access to primary care and preventive services and encouraged health behaviors through care coordination, health education, and patient engagement, which likely reduced the use of costly inpatient care.

This study had several strengths. We analyzed eight years of data, including sufficient observations before and after the Health Enterprise Zone Initiative was implemented. We applied a quasi-experimental study design with a comparison group (residents of ZIP codes eligible to participate in the initiative but not awarded funds by it), and we used a difference-in-differences model to control for fixed differences in hospital utilization between the comparison group and the ZIP codes that were awarded funds. We also examined a subset of conditions that should be sensitive to the intervention's activities. Our falsification tests suggest that our findings of reductions in inpatient stays were

valid. Lastly, in the cost analysis we used charge data for the state—which, because of Maryland's all-payer model, is closely aligned to resource use since it is what insurers and patients actually pay for services.<sup>26</sup>

## Conclusion

Improving access to care and reducing health care costs are key factors in reducing health care disparities. The Health Enterprise Zone Initiative demonstrated how states can use funds to create opportunities for community-based organizations and health care systems to leverage resources to benefit underserved communities. The initiative provided incentives and funding to attract health care providers to underserved communities, since limited access to health care professionals such as primary care providers, behavioral health specialists, and community health workers contributes to health disparities.<sup>4,5</sup> It also supported the coordination of health care and social services for vulnerable populations. The program was associated with improved access to care and reduced inpatient admissions and their associated costs. These reductions could justify continued financial investment from the State. Policy makers should consider promulgating the intervention to other eligible communities. Additional support could be provided by the health plans that benefit the cost savings as a result of lower hospital use, or hospitals could fund additional zones as part of their community benefit responsibility. ■

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## NOTES

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