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Changes in access to nearest Federally Qualified Health Centers and Rural Health Clinics among rural ZIP codes that did and did not experience a hospital closure, 2006-2018

- By 2018, over half of all (16,119) rural ZIP codes were within 30 miles of its nearest Federally Qualified Health Center (FQHC).
- By 2018, approximately 18% of rural ZIP codes were within 30 miles of its nearest Rural Health Clinics (RHC).
- Compared to ZIP codes not affected by a rural hospital closure, the affected rural ZIP codes saw improved access to both FQHCs (4.3 percentage increase in being within 10 miles of its nearest FQHC) and RHC (5.5 percentage increase in being within 10 miles of its nearest RHC).

INTRODUCTION

Rural hospital closures, which this brief defines as facilities that stopped providing general, short-term, or acute inpatient care, had been increasing in the time period prior to the COVID-19 pandemic.^{1,2} Nearly 40 rural hospitals closed in 2019 and 2020 alone³ with closures more than doubling between 2013 and 2017 compared to the preceding 5-year period.⁴ Many studies have drawn attention to the complexity and consequences of not meeting the rural demand for more geographically accessible health care services after a hospital closure.^{5,6}

Recently, geographical access to community healthcare services, including Federally Qualified Health Centers (FQHCs) and Rural Health Clinics (RHCs), has been associated with a range of changes in healthcare services access as a result of rural hospital closures.^{4,5} Both FQHCs and RHCs are an integral part of rural community healthcare infrastructure. In particular, the FQHC program has received a dramatic influx of funding since the enactment of the Patient Protection and Affordable Care Act.⁷ However, recent findings show that FQHCs are more likely to emerge within urban areas, within communities with greater socioeconomic advantage, as well as within areas where FQHCs are already operating.⁸ Similarly, the 2020 GAO report found that between 2012 and 2017 there was an 11.1 percentage point increase in the number of FQHCs within counties that experienced a rural hospital closure, but this was less than the increase in FQHCs in non-closure counties.⁴ RHC growth as well as the loss of providers has been tied to Medicaid expansion with both hospital closures as well as RHC closures being demonstrably higher among states that did not elect to expand Medicaid.^{9,10}

The recent findings that access to these services shows an association with hospital closures raises a number of important questions about the downstream effect on potential increase in demand for community healthcare services. This is not to imply that community providers should be called upon to meet all the preventative, therapeutic, or emergency needs within these areas, but it is important

to discuss and analyze whether changes in access are being experienced differently from other areas. This brief explores changes in geographic accessibility within rural ZIP codes throughout the U.S. to FQHCs and RHCs between 2016 and 2018. It compares changes in access to services within rural counties that experienced the loss of its nearest hospital to changes in access that were experienced within rural counties that never experienced a hospital closure.

FINDINGS

Changes in straight-line distances to FQHCs and RHCs

Figure 1 shows the overall number and geographic distribution of rural ZIP codes that experienced a decrease, no change, or an increase in straight-line geographical distance to its nearest FQHC site between 2006 and 2018. In total, just over half of the 16,119 ZIP codes categorized as large rural, small rural, and isolated rural saw straight-line distances to its nearest FQHC decrease with 8.8% of areas experiencing a decrease by more than 30 miles (n=1,480). Only 16 ZIP codes, located primarily in the West and Southwest, saw distances to its nearest FQHC increase by over 30 miles. Trends in access to FQHCs within only the ZIP codes that experienced a hospital closure were similar. In total, 55.5% of all closure ZIP codes experienced a decrease in straight-line distance to its nearest FQHC with 9.5% of closure ZIP codes experiencing a decrease of more than 30 miles.

Figure 1: Change in straight-line distances to the nearest FQHC for rural ZIP codes (RUCA primary codes 4 – 10) between 2006 – 2018. All distances calculated using straight-line (“crow fly”) distances of ZIP code centroids.

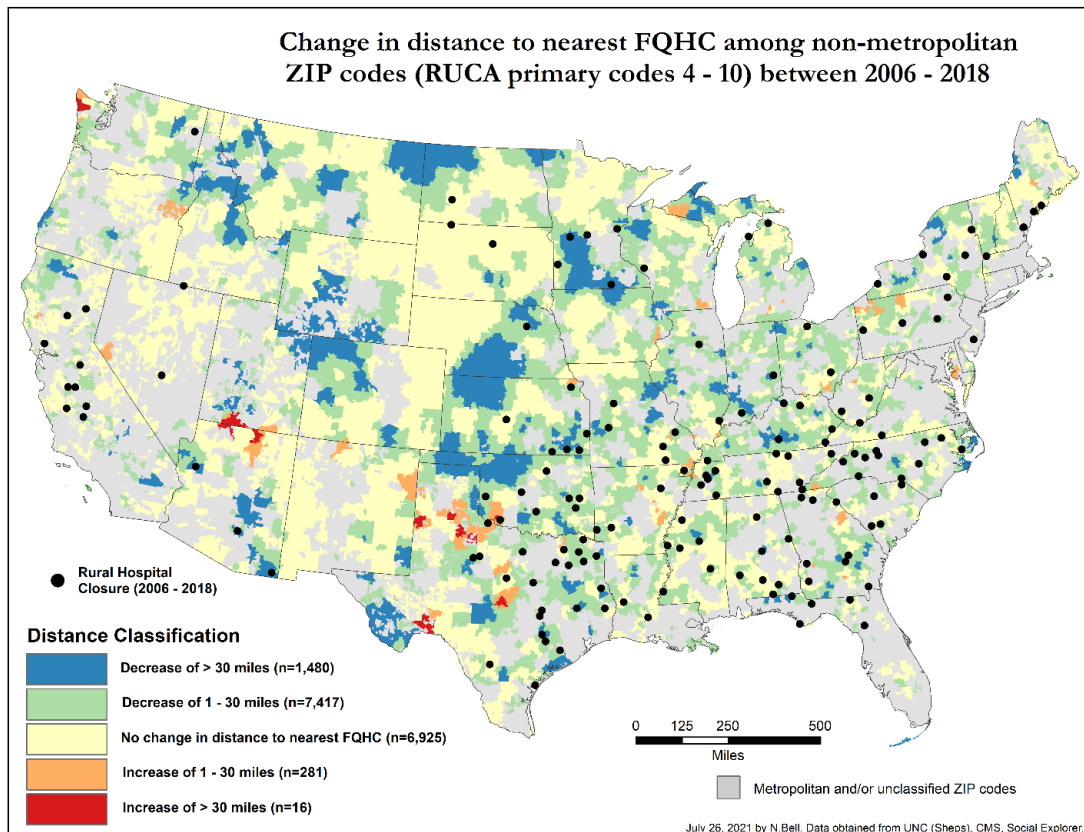
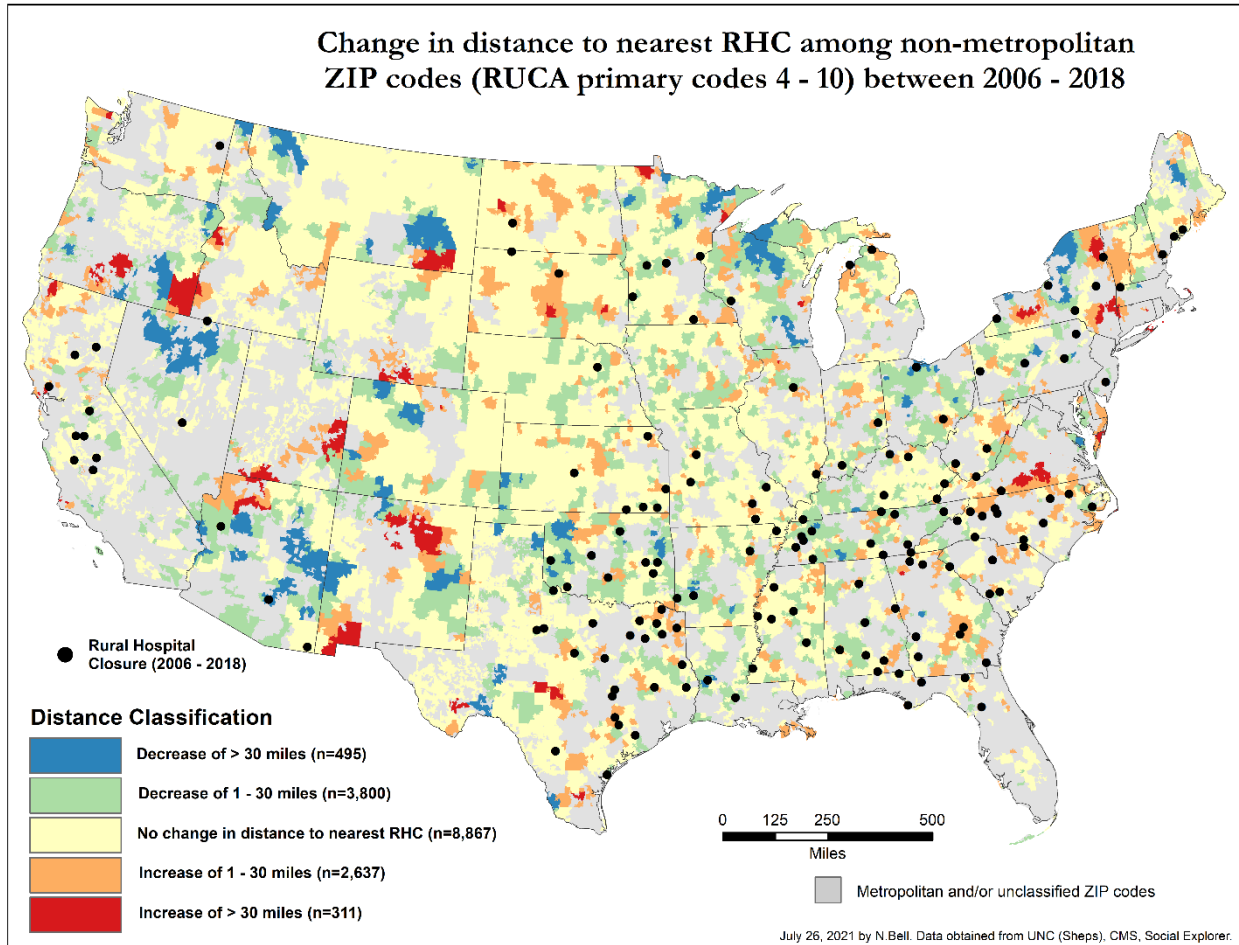


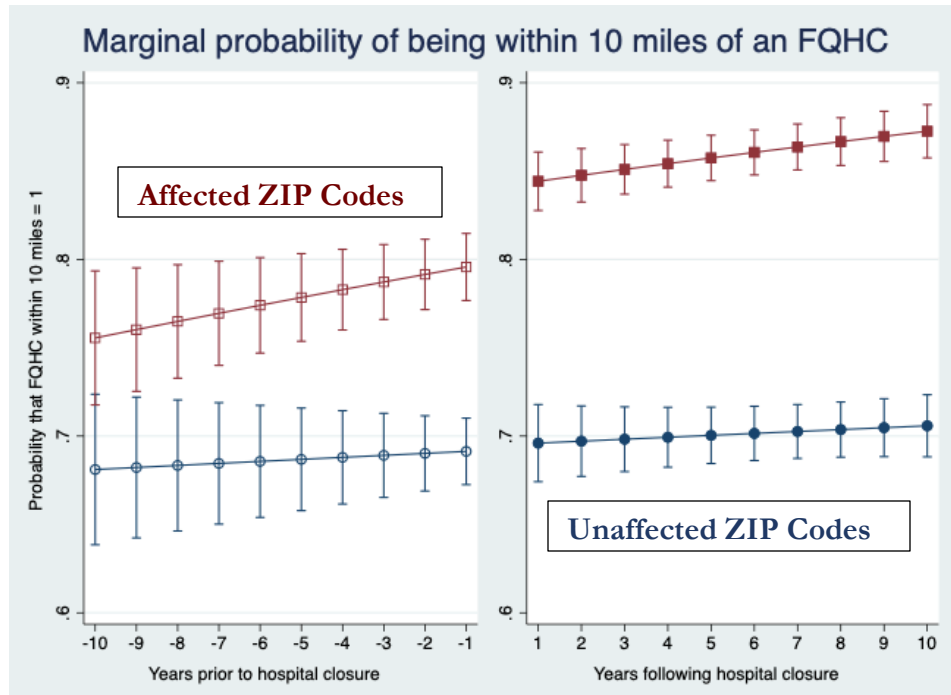
Figure 2 mirrors the results shown in figure 1 onto distance calculations from rural ZIP codes to its nearest RHC. In total, 18% of rural ZIP codes saw an increase in straight-line distance to its nearest RHC over the same time including an increase of more than 30 miles for more than 300 rural ZIP codes. By comparison, 16.9% of rural ZIP codes that experienced the loss of its nearest hospital experienced an increase in straight-line distance to its nearest RHC.

Figure 2: Change in straight-line distance to the nearest RHC for rural ZIP codes (RUCA primary codes 4 – 10) between 2006 – 2018. All distances calculated using straight-line (“crow fly”) distances of ZIP code centroids.



The estimates in **figures 3 and 4** are the result of the matched analysis comparing trends in FQHC and RHC within ZIP codes that experienced the loss of its nearest hospital to the growth patterns within a similarly defined set of rural ZIP code controls. All matches (6:1) were completed using RUCA classification type and income quartile with RUCA classification being defined as large rural (categories 4.x, 5.x, 6.x), small rural (categories 7.x, 8.x, 9.x) and isolated small rural (category 10.x).¹² In total, the results contrast differences in access among the 1,094 rural ZIP codes that experienced the loss of its nearest hospital to changes in access within 6,564 similarly defined non-closure rural control ZIP codes.

Figure 3: Estimated impact of hospital closure on access to FQHCs, 2016 - 2018. Closure ZIP code trends shown in red.



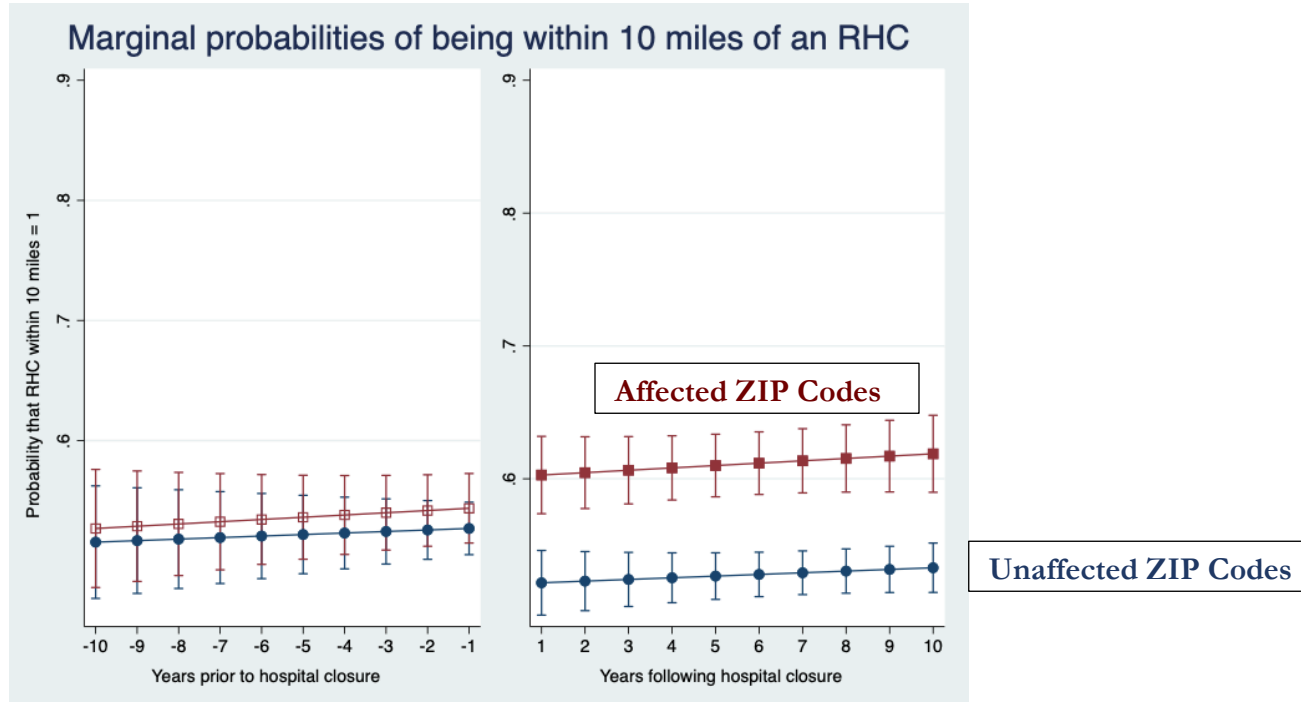
Trends in Straight-Line Distances to FQHCs before and after hospital closures among rural ZIP codes that did and did not experience the loss of its nearest hospital.

Table 1 shows that after allowing for the annual linear trend in FQHC growth, rural ZIP codes that experienced the loss of its nearest hospital also experienced an immediate increase in being within 10 miles of its nearest FQHC by 4.3 percentage compared to trends occurring in a set of non-closure rural control ZIP codes. These differences in gains could have been as small as a 2.0 percentage point increase or as large as 6.5 percentage point increase given our assumptions (95% Confidence, $p < 0.000$). Among ZIP codes affected by a hospital closure, the probability of having an FQHC within 10 miles increased by 0.4 percentage points annually following the hospital closure ($p < 0.001$). We did not observe a statistically significant change point estimate in access to FQHCs within 10 miles on an annual basis among the non-closure control ZIP codes.

Table 1: Estimated percentage point changes in FQHC access immediately following the closure and post-closure annual trends in access among case and control ZIP codes by RUCA rural classification type, 2016 - 2018.

	FQHC		
	AME	95% CI	p value
Closure ZIP codes	4.27	2.03 – 6.52	0.000
Non-Closure Rural controls	0.25	-1.26 – 1.75	0.749
Annual change: closure ZIP codes	0.41	0.12 – 0.69	0.005
Annual change: control ZIP codes	0.11	-0.16 - 0.38	0.082

Figure 4: Estimated impact of hospital closure on access to RHCs using a comparative interrupted time series design. Closure ZIP code trends shown in red.



Trends in Straight-Line Distances to RHCs before and after hospital closures among rural ZIP codes that did and did not experience the loss of its nearest hospital.

Table 2: Estimated percentage point changes in RHC access immediately following the closure and post-closure annual trends in access among case and control ZIP codes by RUCA rural classification type, 2016 - 2018.

	RHC		
	AME	95% CI	p value
Closure ZIP codes	5.55	1.94 – 9.16	0.003
Non-Closure Rural controls	-0.77	-2.37 – 0.83	0.349
Annual change: closure ZIP codes	0.18	-0.21 – 0.42	0.359
Annual change: control ZIP codes	0.13	-0.17 - 0.42	0.402

After allowing for the annual linear trend in RHC growth, our results suggest that rural ZIP codes that experienced the loss of its nearest hospital also experienced a 5.5 percentage point immediate (i.e., next year) increase in being within 10 miles of its nearest RHC compared to trends occurring in a set of matched non-closure rural control ZIP codes. These differences could be as low as a 1.9 percentage point increase, a small improvement in access, to a 9.2 percentage point increase in access, a significantly large improvement in access (p 0.003). Following the hospital closure there was no indication that access to RHCs continued to increase on an annual basis for either closure ZIP codes or non-closure controls.

CONCLUSIONS

Our results indicate that the pattern of rural hospital closures may have indirectly led to improved access for rural populations to other community healthcare services including FQHCs and RHCs. The closest available data to this study's findings are those from Miller *et al* (2021) that found a 5.95 and 11.57 average straight-line increase in FQHC access within the first five years following a closure but no overall change in proximity to RHCs.⁵ One shortcoming of these findings was that they lacked information from a comparison group's deviation from its baseline trend which we included to provide an estimate of the mean counterfactual outcome as a result of hospital closures. Our findings add to the emerging literature on the impact that policy and regulatory changes are having on access to community health services in rural areas. We found a statistically significant improvement in access to FQHCs and RHCs relative to changes occurring throughout other rural areas respectively.

In most instances, **access to FQHC had been increasing prior to hospital closures and continued to improve in the years following a closure.** In contrast, **geographic proximity to RHCs remained relatively stable following hospital closures** and distances remained greater, on average, than distances to access FQHCs. These descriptive findings were further substantiated in the interrupted time series analysis. This analysis showed no overall annual improvement in access to RHCs in the years that followed a hospital closure either among ZIP codes affected by the closure or in non-closure rural controls.



Prior studies on access to FQHCs and RHCs among rural ZIP codes affected by hospital closures have focused on the ZIP codes where the hospital closure occurred.¹² Similarly, the GAO report was based on changes in access at the county level.⁴ This evaluation expanded the analysis to all rural 1,096 ZIP codes that were affected by a loss of their nearest rural hospital not just the 118 ZIP codes where the closures occurred. Our findings support these previous findings and add to the information base a comparison metric from changes in access occurring across rural America.

Our evaluation did not include an assessment of changes in access to other rural safety-net providers including Disproportionate-Share Hospitals and Critical Access Hospitals which also play essential roles in providing definitive healthcare services to socially and geographically vulnerable populations. Further analyses are still warranted to monitor trends in access to these important healthcare services providers.¹³ In addition, this analysis focuses on changes in potential access not realized access. It does not specify whether the discontinuation of local hospital services is differentially impacting hospital closure areas.

Quantifying the impact that access to FQHCs and RHCs has had on rural populations is important for ongoing policy decisions. Residents of rural communities are typically older and more likely to

live in poverty compared to urban populations^{14,15} Hospital emergency departments are also a major source of primary care in rural areas (especially among the uninsured), and closures can require other providers to fill the gaps through expansion of primary care and other outpatient services.⁷ Additional studies are needed to equate whether changes in potential access to healthcare services shown in this study correlate with changes in realized access as well as whether these changes are similarly patterned throughout different rural classification types (e.g., isolated rural areas). Continued assessment of changes in emergency service use within areas impacted by rural hospital closures is particularly warranted.¹⁶

Geography is often a strong predictor of health service use. For example, studies consistently show that rural residents must travel farther to access health care services,¹⁷ and in many instances alter the type of treatments received.¹⁸ Continued monitoring of change in access to rural community healthcare services remains important for monitoring whether the proximity to community healthcare services is evolving within changes to the overall rural healthcare infrastructure.

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APPENDIX

Methodology

Active RHCs and FQHCs (including look-a-like sites) were identified using the Centers for Medicare & Medicaid Services (CMS) Provider of Service files for 2006 through 2018. We identified complete and converted closures of rural short-term, acute care, and/or critical access hospitals using data provided by the North Carolina Rural Health Research Program (NC RHRP) at the Cecil G. Sheps Center for Health Services Research which tracks rural hospital closures across the country.²⁰ We identified rural ZIP codes according to the 2010 Rural-Urban Commuting Area (RUCA) codes that delineate metropolitan, micropolitan, small town, and rural areas. We combined micropolitan, small town, and rural commuting areas into 3 categories defined as large rural (categories 4.x, 5.x, 6.x), small rural (categories 7.x, 8.x, 9.x) and isolated small rural (category 10.x).¹²

We calculated straight-line ("crow-fly") distances for all contiguous U.S. ZIP code centroids to its nearest short-term, acute-care, or critical access hospital for the years 2006 through 2018 using the Sheps definition of a rural hospital closure. We flagged all ZIP codes whose nearest hospital was identified in the Sheps rural hospital closure database. Straight-line distances for each ZIP code centroid to its nearest rural RHC and FQHC were similarly estimated providing pre-closure, closure year, and post-closure estimates for all ZIP codes that had been impacted by the loss of its nearest hospital not just the rural ZIP code where the closure occurred.

A selection of ZIP codes controls was identified by randomly (without replacement) assigning 6 non-closure ZIP codes (those never experiencing nearest hospital closures from 2006 to 2018) to each closure ZIP code. The closure-control pairs were matched to each ZIP code 'case' area using its RUCA rural classification type and its median household income quartile. Control ZIP codes straight-line distances to the nearest FQHC and RHC were similarly estimated. Controls were assigned the same pre-closure, closure year, and post-closure year as the case ZIP codes.

For comparisons, we categorized change in straight-line distances pre/post closure into binary classifications of being within or beyond 10 miles to the nearest FQHC/RHC. We did not delineate whether the nearest service center was in a rural or urban area. The classifications were used to simplify the interpretation of access as well as to use discrete categories that reflect distance units commonly used for establishing maximum access standards to primary care providers.²⁰ Trends in the predicted probability estimates were evaluated using a comparison interrupted time-series analysis. Average marginal effects and changes in annual distances to services were evaluated for up to 10 years prior to the closure and up to 10 years following the closure.