

```

plt.show()

directly_affected_zips = texas_closures_by_zip['ZIP_CD'].nunique()
print(f"Number of Directly Affected Zip Codes in Texas:
    ↪ {directly_affected_zips}")

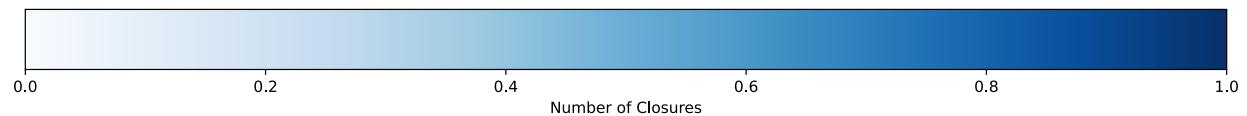
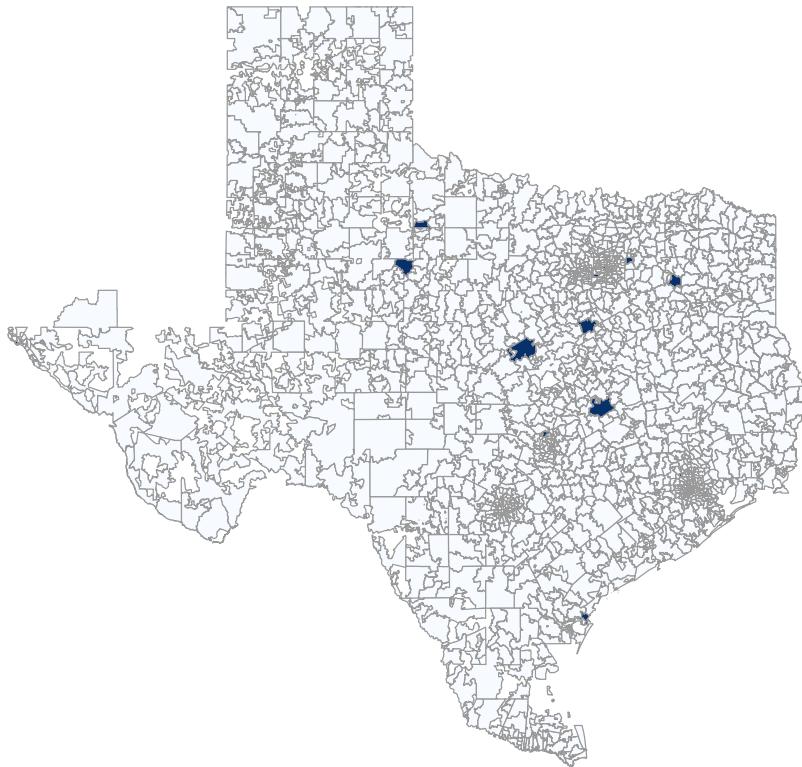
      GEO_ID  ZCTA5    NAME    LSAD  CENSUSAREA  \
0  86000000US78624  78624  78624  ZCTA5      708.041
1  86000000US78626  78626  78626  ZCTA5      93.046
2  86000000US78628  78628  78628  ZCTA5      73.382
3  86000000US78631  78631  78631  ZCTA5      325.074
4  86000000US78632  78632  78632  ZCTA5      96.278

      geometry  hospital_count  \
0  POLYGON ((-98.96423 30.49848, -98.96416 30.498...      1.0
1  POLYGON ((-97.60944 30.57185, -97.61688 30.568...      0.0
2  POLYGON ((-97.69285 30.57122, -97.69286 30.571...      0.0
3  POLYGON ((-99.13053 30.36555, -99.13065 30.365...      0.0
4  POLYGON ((-97.40946 29.75929, -97.40947 29.758...      0.0

  nearest_distance_miles  closure_count
0              0.000000      0.0
1             11.425191      0.0
2              7.579457      0.0
3             22.673291      0.0
4             15.131525      0.0

```

Texas zip codes directly affected by a closure in 2016-2019



Number of Directly Affected Zip Codes in Texas: 14

3.

```
directly_affected = zips_texas.merge(  
    texas_closures_by_zip, left_on='ZCTA5', right_on='ZIP_CD', how='inner'  
)  
print(directly_affected)  
  
directly_affected = directly_affected.to_crs(epsg=32614)  
  
buffer_meters = 10 / 0.000621371  
directly_affected['buffer'] =  
    directly_affected.geometry.buffer(buffer_meters)
```

```

indirectly_affected = gpd.sjoin(
    zips_texas.to_crs(epsg=32614),
    directly_affected.set_geometry('buffer'),
    how='inner',
    predicate='intersects'
)

indirectly_affected = indirectly_affected[
    ~indirectly_affected['ZCTA5_left'].isin(directly_affected['ZCTA5'])
]

indirectly_affected_count = indirectly_affected['ZCTA5_left'].nunique()
print(f"The number of directly affected zip codes in
    ↪ Texas {indirectly_affected_count}")

```

	GEO_ID	ZCTA5	NAME	LSAD	CENSUSAREA	\
0	8600000US79520	79520	79520	ZCTA5	194.748	
1	8600000US79529	79529	79529	ZCTA5	89.177	
2	8600000US79902	79902	79902	ZCTA5	6.558	
3	8600000US76645	76645	76645	ZCTA5	167.466	
4	8600000US77065	77065	77065	ZCTA5	8.213	
5	8600000US75140	75140	75140	ZCTA5	112.259	
6	8600000US78336	78336	78336	ZCTA5	49.005	
7	8600000US78613	78613	78613	ZCTA5	28.088	
8	8600000US75235	75235	75235	ZCTA5	6.720	
9	8600000US75051	75051	75051	ZCTA5	12.125	
10	8600000US75087	75087	75087	ZCTA5	26.182	
11	8600000US76520	76520	76520	ZCTA5	301.269	
12	8600000US76531	76531	76531	ZCTA5	382.057	
13	8600000US75390	75390	75390	ZCTA5	0.005	

	geometry	hospital_count	\
0	MULTIPOLYGON (((-100.02004 32.96007, -100.0199...	1.0	
1	POLYGON ((-99.73579 33.36257, -99.73584 33.363...	1.0	
2	MULTIPOLYGON (((-106.5034 31.80737, -106.50344...	4.0	
3	POLYGON ((-96.97886 32.08731, -96.97926 32.087...	1.0	
4	POLYGON ((-95.60365 29.90352, -95.60384 29.903...	1.0	
5	POLYGON ((-95.6156 32.70788, -95.61552 32.7077...	1.0	
6	POLYGON ((-97.16871 27.99634, -97.16858 27.996...	1.0	
7	MULTIPOLYGON (((-97.80206 30.47071, -97.80211 ...	2.0	
8	POLYGON ((-96.84953 32.81137, -96.84928 32.811...	2.0	
9	POLYGON ((-96.92616 32.74964, -96.92613 32.749...	1.0	
10	POLYGON ((-96.48988 32.98188, -96.48696 32.981...	1.0	
11	POLYGON ((-96.67918 30.84405, -96.6789 30.8431...	1.0	
12	POLYGON ((-97.96613 31.77156, -97.96527 31.770...	1.0	
13	POLYGON ((-96.8406 32.81349, -96.8406 32.8138, ...	2.0	