



## **SOCIO-SPATIAL ANALYSIS OF MEDICAID PRIVATE PROVIDERS ACROSS THE STATE**

**Quinn Molloy  
Ph.D. Candidate, University of Connecticut**

**September 1, 2022**

### **Data Collection Methodology**

Data were derived from a base dataset of dental facilities, geocoded using the ArcGIS address geolocator and manually refined. This dataset was not close to exhaustive. Due to a lack of publicly available data provided by the state of Connecticut, manual data collection via research and digitization ensued. Researchers mirrored the process an individual might embark on to find appropriate dental care. The data collection process was as follows:

1. **Search** a very localized scale in **Google Maps** for dental locations
2. **Confirm** office locations in **Google Street View**
  - a. If inconclusive (old imagery, no office visible) rely on step 3
3. **Confirm** digital footprint via **web search**
  - a. In rare instances where there was no imagery, no web footprint, but numerous, recent customer reviews, the location was recorded in the database
4. **Digitize** office location in database
  - a. Include name, address, specialization, phone number
5. If no digital footprint and no imagery confirmation, add location to the **list of unconfirmed offices**
6. In rural towns, check town website for **business roster**
  - a. Add any additional locations to database or unconfirmed location list
7. Add **missing locations** from the Husky Dental anonymous call report
8. **Remove all specialty locations**, only general dentistry practices included
  - a. Some pediatric, orthodontic, endodontic, or other specialty locations were collected though not included in the analysis

Data collection took place in the Fall of 2021. The resulting dataset is also likely not exhaustive, missing new locations or locations that might only be discoverable in-person with no web presence. Search engine API data pulls were not used as many dental offices no longer existed (example, Fig. 1). Further inspection of API data revealed



many dental *practitioners had retired or passed away*, though their offices were still listed as active. It is the belief of the researchers that the dental location data in Google Maps is pulled from an outdated list that may have also included the home addresses of some licensed dental health practitioners. If we could not find an office, it would likely be very difficult for an individual to find that office to confirm their Husky Dental acceptance policy. An exhaustive list of intentionally excluded offices, such as those unable to be confirmed or specialty practices, is available upon request.

## **Data Suggestions**

The state of Connecticut could provide an open access digital, downloadable map resource of all dental locations searchable by location, specialty, services, insurance, and Husky Dental acceptance status. Reliance on proprietary search engines, word of mouth, or non-profit intervention places a disproportional burden on individuals looking for dental care access. Some insurance groups provide similar maps, but households with mixed dental coverage would need to use multiple sources to find a location with acceptable coverage. The existing system for location discovery may drive customers to larger dental health franchises that have more success in search engine optimization (eg: Mondovi Dental, Gentle Dental), or practices that are no longer active. The state currently maintains record of dental locations that could be converted into a user-friendly resource with timely information that customers might use to make decisions about their health care. Dental health offices would provide updated location data annually or when a significant change in services was made. This information could also be regularly shared with digital discovery platforms like Google or Bing to ensure customers have accurate and timely provider data no matter their search technique.



Figure 1: Example location relating the importance of manual confirmation. The office has a web presence and is visible in some imagery but has clearly closed in later imagery.

## Location Analysis

Initial accessibility maps of the state are misleading, failing to uncover trends in location and population density. General coverage is an inappropriate method for assessing service quality. In the below example, the entire state of Connecticut is covered by a 30-minute drive time buffer to each dental healthcare facility, excepting a notable piece of Salisbury and a few coastal areas (Figure 2). The highlighted example area shows customer origin points that could reach the office via a 30-minute drive. It is unlikely that a single location could exclusively meet the dental care needs of towns that fall within the service area. The following analysis will provide alternative ways of assessing dental health access equity within the state.

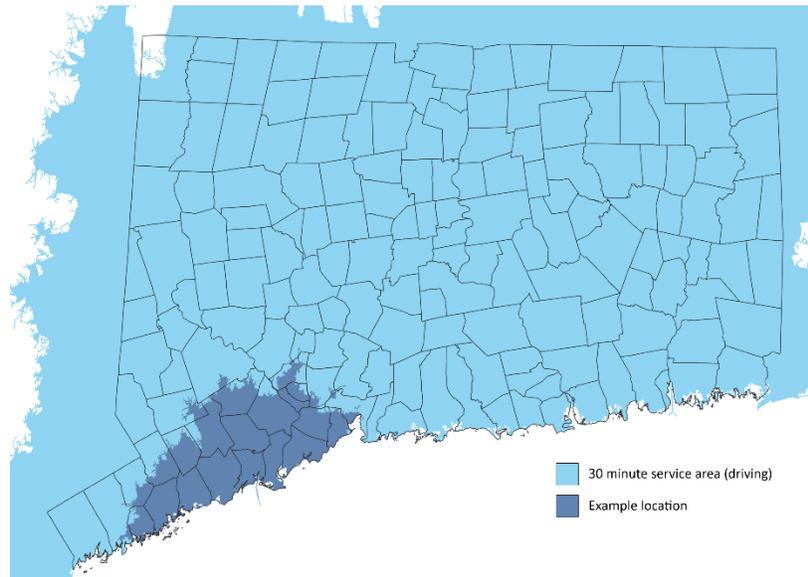


Figure 2: 30-minute service area example

## Office locations

Total number of offices = 1385

Total number of offices with transit\* = 838/1385 = 60.5%

Total Medicaid offices = 449/1385 = 32.4%

Total offices with Medicaid and transit = 298/1385 = 21.5%

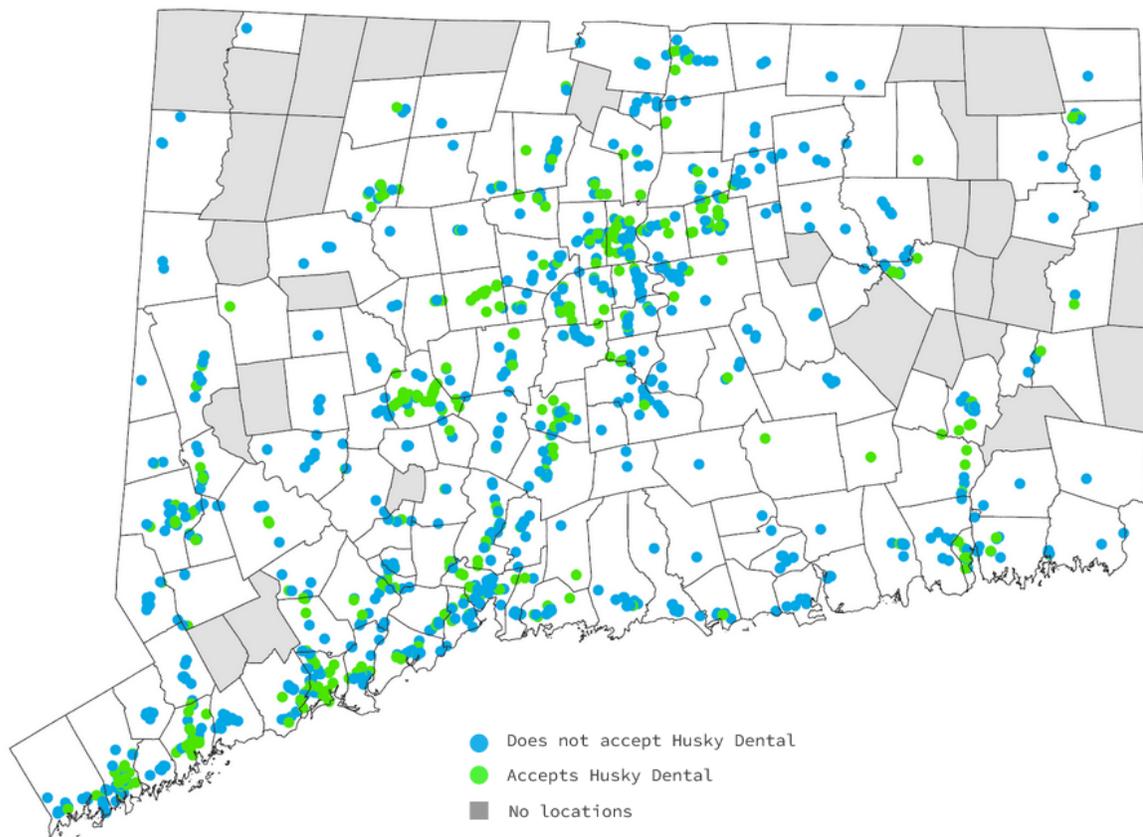
Towns with offices = 140/169 = 82.8%

Towns with Medicaid offices = 89/169 = 52.6%

Towns with pedestrian access to Medicaid offices = 100/169 = 59.2%

Towns with Medicaid transit offices = 60/169 = 35.5%

\*Transit offices are those within a 15-minute walk of any transit stop



### Office locations by population

Examination of dental office access by population reveals that dental office saturation is highest along the Interstate 91 corridor (Figure 3). As this considers drive time distance and Connecticut is a state deeply entrenched in automobility, it makes intuitive sense that people who live close to highways would have more saturated dental access.

This approach may overrepresent areas with low populations and high dental office saturation, an example being a commercial strip with multiple offices but very little residential development. One place where this can be seen is the area surrounding Newtown Middle School, where there are multiple dental offices, but is largely unoccupied, resulting in a low population density.

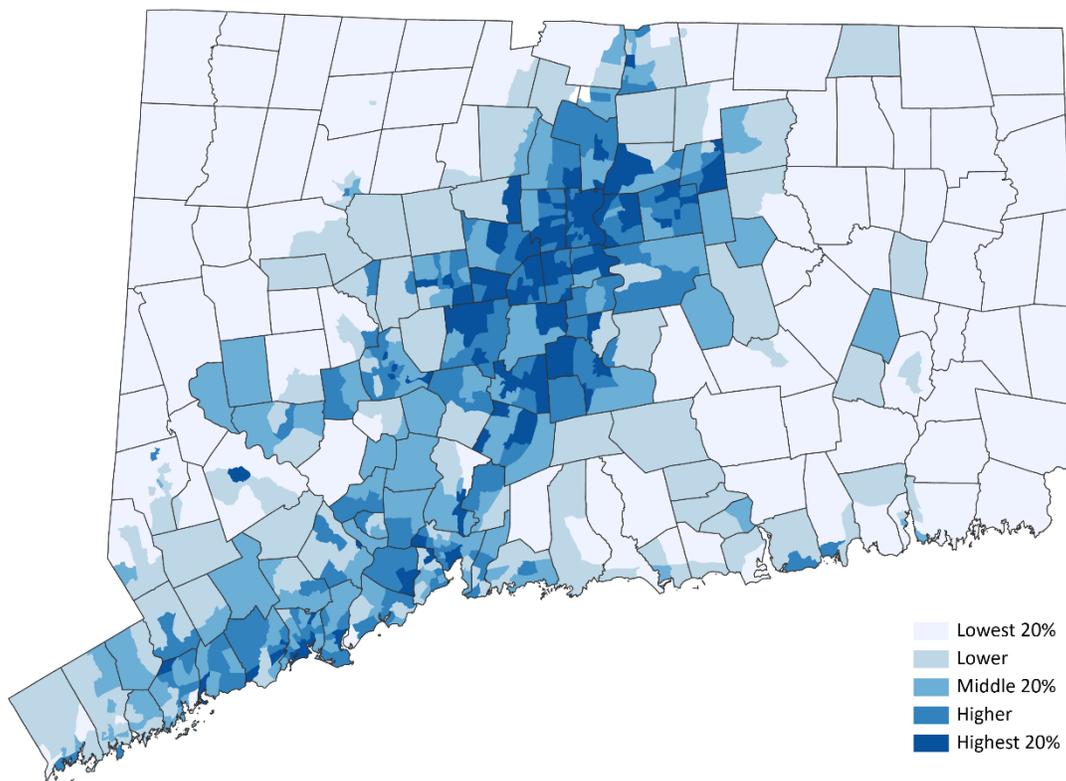


Figure 3: Dental Access by Population (2020 ACS Tracts)

## Location Saturation

Location saturation with 30-minute drive service areas. Each resulting area is given a count of the drive time areas that encompass the central point of the census geography. Highest access in the center of the state along I-91 where households have access to Hartford and New Haven. Base location saturation is again, not a great measure of accessibility. The resulting map closely mirrors population density and highway layouts in the state.

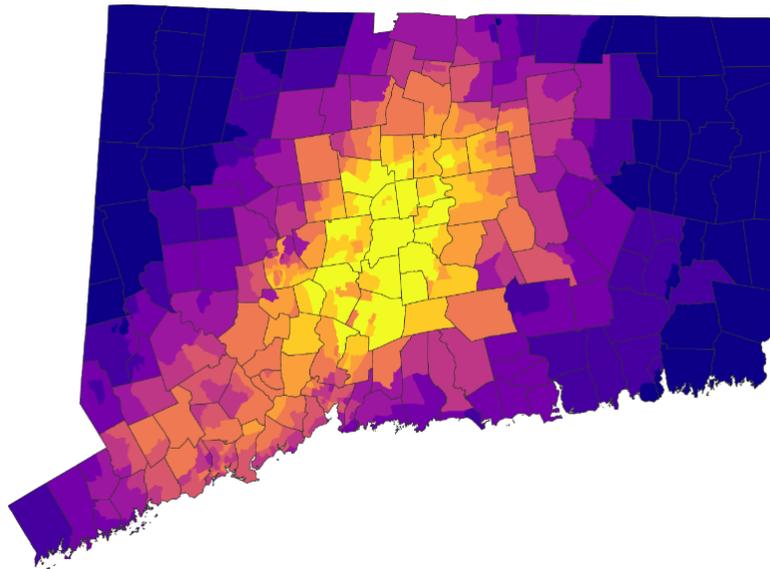


Figure: Location Saturation

## Two Step-floating Catchment Area

Households must compete for service with other households in a facility catchment area. Accessibility is a function of both location saturation and “congestion” (how many other people are competing for service). This provides a more appropriate measure that accounts for competition for service in high-density areas. Each dental health location is given a 30-minute drive time buffer referred to as a catchment area, then the total proportion of the population as assigned by the percent of the census tract found within the catchment area is assigned to each location. This is a modified version of the Two Step Floating Catchment Area analysis that does not include the number of provider hours at each location, due to data restraints.

Definition

1. Each location is assigned a congestion measure (1/total population within catchment)
2. Each census tract receives a sum of all facility congestion measures they have access to

The final result reveals that accessibility in the state is much more dispersed than previously thought, the best in the areas between Hartford and New Haven, and in central Fairfield County. These places have access to urban dental health providers, and less congested suburban providers and may choose whichever meets their needs. Urban areas perform slightly worse than they do in the location saturation analysis, as those places are in high-density areas that are also accessed by suburban and rural populations who may also choose to use urban services. Rural areas in the north of the state still perform the worst, likely contributed to by edge effects where we do not have out-of-state data. This is still an appropriate use of the measure as many households may not be aware of their ability to use benefits across state lines.

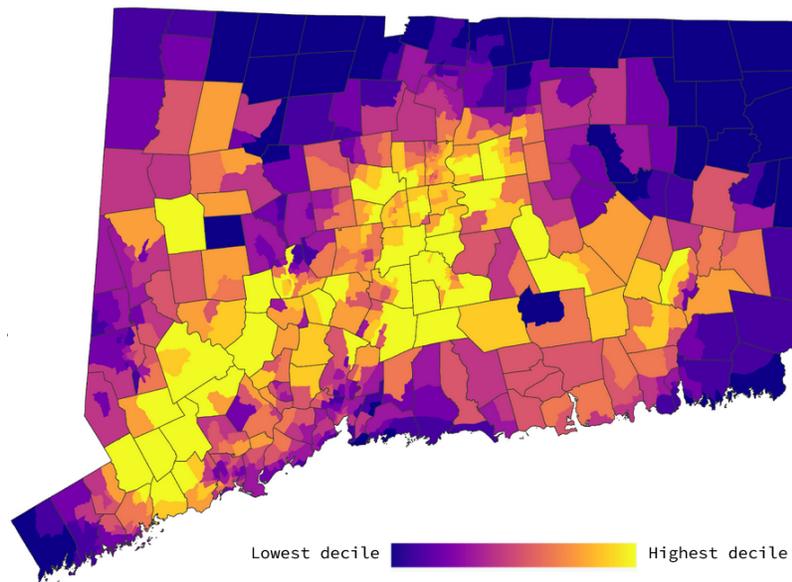


Figure: All offices modified 2-step floating catchment area analysis

Areas with a high number of households in poverty were highlighted to reveal places that may benefit from improved access to Medicaid locations. The coast to the east of New Haven performs worse than in the analysis of all office locations, as does the western region bordering New York state. Smaller cities outside of the capital region would also benefit from improved Medicaid office access as they have a higher number of households in poverty but relatively poor access. Targeting these peripheral cities such as East Haven, Norwich, Danbury, Killingly (and so on) may result in improved outcomes for the greatest number of residents. As this is a comparative analysis between places in the state, it is difficult to assess the overall quality of access in the state, only how places relate to one another.

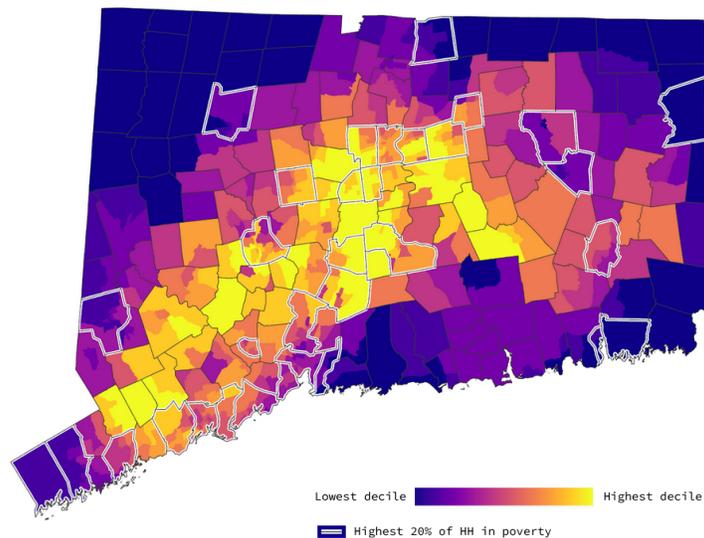


Figure: Medicaid offices modified 2-step floating catchment area analysis

### Husky Dental

Of the 1,385 physical *general dentistry* facilities confirmed, 449 or 32% accept Husky Dental. The below map shows Husky Dental office location saturation (using the modified 2SFCA measure) by household poverty percentage. Bright pink areas represent places with low Husky Dental saturation and high poverty, bright blue areas represent areas with high Husky Dental saturation and low poverty. The deep mauve areas are comparatively well-served, representing places with high Husky Dental saturation and high poverty rates.

Rural areas are underserved compared to their more urban counterparts even when population is controlled. Cities outside of the I-91/I-95 corridor, like New London, New

Milford, Danbury, Windham, and Killingly also experience low levels of dental access and high levels of poverty. Mansfield is likely an outlier due to a high number of UConn students, who might access dental health care through family insurance plans away from campus.

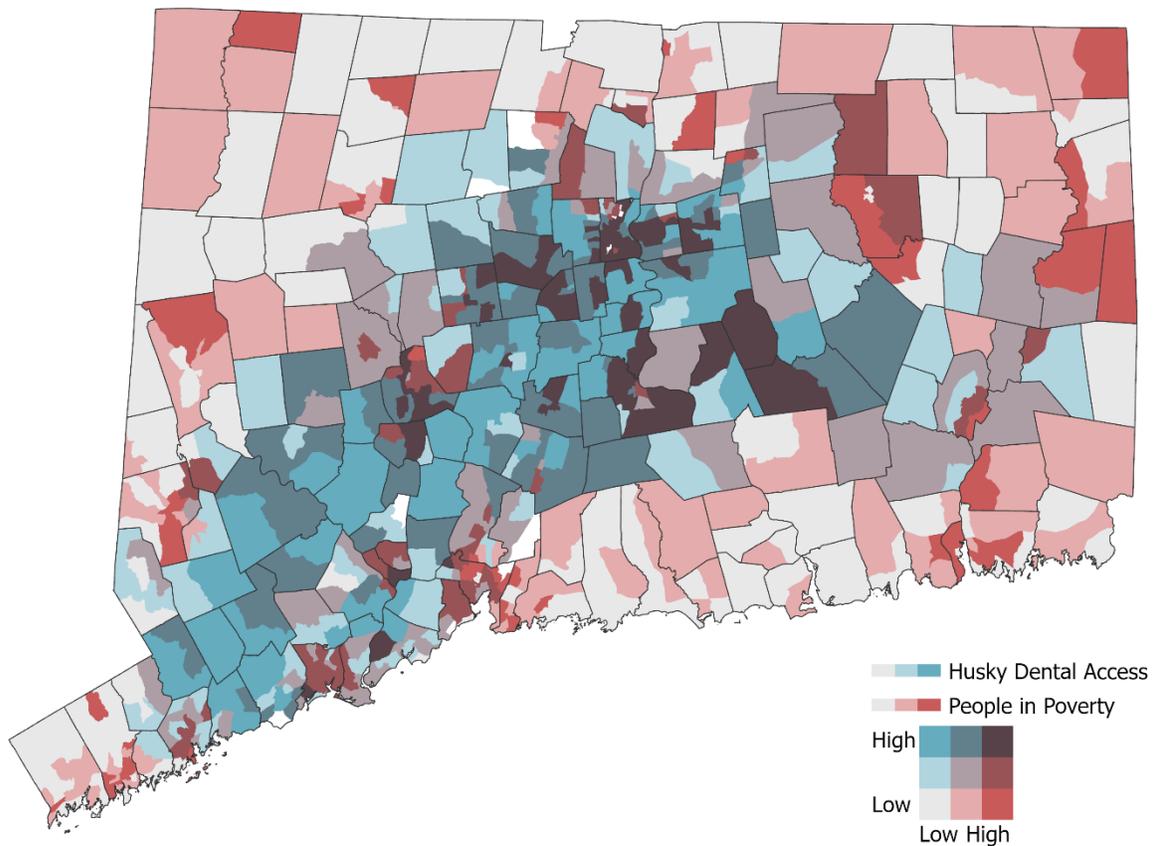


Figure: Husky Dental Access by Households in Poverty

Husky Dental Access in this figure is measured using a *Modified 2-Step Floating Catchment Area Analysis* access score for providers who access Medicaid. This metric accounts for provider density and congestion, but not the quality of a location. The analysis could be further improved were we able to identify the number of *provider hours* available at each location (ex: 2 dentists available at 35 hours a week would be 70 hours).

**An additional spreadsheet of data relating to this analysis, including walk access scores by the municipality can be made available upon request.**

## Barriers to Access

The data collection process required the direct examination of websites and physical locations via google street view imagery, an arduous task that allowed for an understanding of common themes that might dissuade users from accessing a location.

### *Digital Accessibility*

The first barrier to site discovery is a *lack of a web-presence* or active phone number. Many locations do not have a website, or their website is out of date, has been deactivated, or the domain ownership has lapsed and been purchased by a third party. Where it is not a requirement for a private business to maintain a web-presence, it may lead individuals to invest time in confirming location validity, driving to a location that is no longer active, or overlooking offices that may be more convenient.

Existing websites could *improve transparency* regarding Husky Dental acceptance, insurance, and services offered. Websites with obvious and accurate data about Husky Dental and insurance acceptance were extremely uncommon, where present patients without insurance are directed toward CareCredit dental loans, which are inaccessible to people with poor or no credit. Digital barriers to access by Husky Dental users could perhaps be mitigated to some degree if on the main page of each website offices were required to clearly list their Husky Dental acceptance status. Alternatively, the state could maintain a centralized public database of offices that accept Husky Dental.

It is difficult to identify individual office capacity to support customers with *limited English-language proficiency*. This again could be improved by a state database of available service provider languages. Without alternative language options, a customer with limited English proficiency would experience extreme difficulties accessing any of the web services mentioned above. A small number of offices state in text on their website that other languages are spoken, but there is no way to identify these as a group to make informed decisions about which location suits a customer's needs.

### *Physical Accessibility*

There are a few accessibility issues related to physical site location and design revealed during our location discovery process, the most common being facility limitation, location isolation, built-environment characteristics, and clustering.

*Facility limitation* is used here to describe structural elements that might prevent user access. These include missing curb cuts/ramps (breaks in the sidewalks), steep stairs, a lack of visible ramps or elevators, or unclear signage. Uncertainty surrounding the ability to enter a building safely might dissuade customers with mobility limitations from making or completing appointments. There are sometimes legal measures in place to ensure physical accessibility through universal design, but no way for individuals to

confirm compliance without in-person scouting. The below example does have a ramp for patients, but it is not visible from the street.



Figures: Facility limitations

*Location isolation* refers to sites located in office parks and hospital campuses that are isolated from other commercial or residential activity, or those located along state highways with limited pedestrian infrastructure. Where these campus locations may have private interior sidewalks or shuttle transit, getting to the location would often require vehicle use, or multiple transit transfers. These are often expansive facilities with large parking lots and multiple buildings that may not be easily traversed without vehicle use. Campus locations often have the capacity to support a high number of patients but are located in areas with a low residential density.



Figures: Location isolation

The *built-environment* of Connecticut can be characterized by extensive *sprawl*, where urban centers have been depopulated in favor of automobile-oriented suburban towns that are not readily converted into places where other modes of transportation can be easily used. Many of these towns have almost exclusively residential zoning. For non-residential activities, these sprawl towns often rely on other communities where commercial activity has been allowed, in the form of a downtown or more common strip development along state highways. Dental facilities located in these types of developments serve a more dispersed residential population, and many of these commercial strips do not have safe transit, pedestrian, or bicycle access. They also may be zoned as exclusively commercial developments, where significant residential populations would live farther from access than could be easily walked. This is not easily remedied, but is important to note as mixed-use zoning, activity density, and transportation diversity have become popular planning techniques to reduce climate emissions, reduce household spending, and alleviate the housing crisis. Dental health access may also be improved via these techniques.



Figures: Built-environment

Another complication of zoning results in location *clustering*. Some towns have parcels that encourage medical uses, and multiple dental offices. This may benefit office saturation in areas with high populations that would need to be served by more than one practitioner, but many are found in more dispersed areas of suburban sprawl. This compounds access problems by individuals living outside of the highly saturated access-shed and would require many users to visit the same location for service over a parcel closer to their home or work, exacerbating potential congestion. A mitigation technique might be found in increasing the number of areas that allow mixed-use zoning.



Figures: Office clustering