

The Missing Middle:

Understanding Low-Rise, Moderate-Density Housing in Greater Boston

By

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Abstract

Over the past 75 years, the United States' housing stock has become increasingly bifurcated, with the overwhelming majority of units taking the form of single-family homes or mid- and high-rise apartments and condos. This trend has made scarce the kinds of low-rise, moderate-density typologies that had historically provided the dense, compact urbanism necessary to support transit, walkability, and neighborhood retail. Dubbed the "Missing Middle" by their advocates, these housing types – townhouses, duplexes, courtyard apartments, and the like - are championed for their potential to deliver the benefits of residential density in forms that are more compatible with the character of existing suburban neighborhoods than their larger multifamily counterparts. They are also promoted for their ability to improve affordability in hot housing markets through the incremental addition of smaller units and improved land use efficiency.

This thesis seeks to explore the concept of the Missing Middle including the characteristics of its forms, the trends in its permitting and construction, and the barriers to its development. Focusing on Greater Boston, and three of its suburban towns in particular, the research draws on census data analysis and semi-structured interviews to understand the distribution of this housing in the region, the extent to which its development lives up to the claims of advocates, and the potential reasons for its decline. Results indicate that while Missing Middle units have historically been concentrated in cities in Greater Boston's urban core, some suburbs are experiencing an increased interest in their development. However, in many cases, recently constructed examples of the Missing Middle in suburban contexts do not achieve the walkability and affordability goals of its supporters. The research finds that barriers to the permitting of suburban Missing Middle units are largely regulatory in nature, stemming from density restrictions driven by fiscal zoning considerations and homeowners' opposition to growth, especially in wealthier communities. These findings point to the need for strong regional planning to work across town boundaries, loosening restrictive local zoning while developing adequate protections for neighborhood character in order to promote Missing Middle housing in the development of smart growth and affordability plans and policies.

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Chapter 1

Density, Affordability, and the Suburbs

At nearly 28,000 persons/mi², New York City's population density is the highest in the U.S. among cities with a population greater than 75,000 (U.S. Census Bureau, 2016). This should be expected by anyone familiar with the popular image of the Big Apple – scores of skyscrapers towering over bustling streets as eight million residents shuttle from crowded borough to crowded borough before returning home to their postage-stamp-sized apartments. This view of the city, while undoubtedly seeming exaggaratingly harsh to most urbanists, is precisely the kind of lifestyle many post-war Americans hoped to avoid, spurring a mass exodus to the single-family homes and leafy yards of mid-century suburbs. Density was seen as the enemy of comfort, the mark of tenement slums, and the antithesis of family-friendly residential neighborhood character (Soule, 2006).

It may come as a bit of a shock then that New York City's closest density competitor does not hail from the ranks of large metropolises like Chicago, Philadelphia, or San Francisco. Instead, it's the mid-sized Boston suburb of Somerville, MA, clocking in at over 19,000 persons/mi². What is even more surprising is whereas 54% of New York's housing units are located in 10+ unit structures and 31% in 50+ unit structures, Somerville achieves high density through low-rise residential typologies with 59% of its units housed in 2- or 3-unit structures. Somerville is living proof that the moderate-to-high residential densities that are so important for supporting public transit systems, providing neighborhood retail markets, and allowing for improved walkability do not require high-rise towers, but instead can be implemented through more human-scale development forms.

In fact, cities that grew quickly in the late 19th and early 20th centuries like Boston, New York, and Chicago knew this well and built out thousands of these units to house their burgeoning workforces (Wegmann, 2006). While examples of these building types still exist in these cities, and in no small number, they make up only a tiny fraction of newly constructed units – between 2% and 5% in most large metros.

Termed the “Missing Middle” by national advocates (Parolek, 2014), these structures – duplexes, triple-deckers, townhouses, courtyard apartments, and the like – are viewed as a critical tool in

achieving the higher residential densities of the city while maintaining the appealing low-rise character of the suburbs. Marked by small footprints and unit sizes, shared walls or floors, and simple construction, these typologies are championed as a means of improving not only a community's compactness, but also its affordability.

Proponents of the Missing Middle also point out that the potential for these units is greater now than any time in recent history with demographic trends pointing towards a rise in smaller households, national economic shifts leading to lower rates of homeownership, and spiking local housing markets decreasing affordability throughout the country. Yet cities, and the developers and builders that operate within them, are either unable or unwilling to pursue the construction of Missing Middle units, preferring instead to focus on larger multi-family structures or detached single-family homes.

Why is this the case? Advocates for these typologies tend to blame restrictive land use regulations, claiming that the density requirements of most zoning codes force development away from these middle density structures and towards either the lower or upper ends of the density spectrum. While zoning's impact on urban form is well documented, loosening land use regulations will only result in desired development outcomes when the market is similarly aligned. To what extent this alignment exists today with regard to Missing Middle homes is largely unknown, though the recent trends in consumer preferences towards walkable, urban living conditions provide at least some clue. Still, a greater understanding of the push and pull of regulation and the market on Missing Middle typologies is needed if they are to be successfully promoted and developed in our growing metros.

Though the interaction of regulatory and market forces are often discussed in planning and economic literature on housing and urban development more generally, specific application to Missing Middle typologies has essentially been left unexplored, largely due to the only recent conception of the term. This thesis seeks to address this by asking the following broad questions:

- *What is the Missing Middle? How do we describe its types and characteristics?*
- *Where does the Missing Middle exist? Who occupies these units?*
- *What are the barriers to the development of Missing Middle housing?*

While I first explore these questions at the national scale, I continue by focusing on the Greater Boston region, a growing metropolitan area whose rising housing costs and sprawling development trends point to a need for Missing Middle housing. I further focus on three suburban towns in order

to get a more specific understanding of these units and their development. Using a mixed methods approach that pulls from interviews, built form assessment, and descriptive statistics, I seek to understand how regulatory, market, and other forces combine to influence the development of Missing Middle housing in suburban Boston.

I begin in Chapter 2 by defining the two essential components of “Missing Middle” housing – namely *Middle* and *Missing* – and reviewing the relevant literature on the connections between urban form, affordability, regulations, and the market. I illustrate the various low-rise, middle-to-high-density structures that have been identified with the movement and enumerate their claimed benefits. I continue by assessing the potential demand for these units due to demographic and preference changes and set out the possible barriers put forward by Missing Middle advocates such as restrictive land use regulations, developer and homeowner financing, and community opposition.

Chapter 3 describes the recent patterns of growth in the Boston area and the relevant regional planning studies related to promoting compact and affordable development. It also explores Boston’s history of Missing Middle housing types and the geographic distribution of newly permitted structures. I illustrate general trends in the development of these typologies and how these trends correlate with various demographic, economic, and spatial data.

In Chapter 4, I dive into the case study municipalities, describing their development histories and trends. Through interviews with local and regional planners, area developers, and others I lay out the views of professionals working in this context regarding the potential for Missing Middle housing development and its most prevalent barriers. I supplement these interviews with cursory analyses of built form of recently permitted units.

The thesis concludes in Chapter 5 with a summation of the findings and limitations of this study, the opportunities and challenges for Missing Middle housing in suburban Boston, and suggestion for future research.

Chapter 2

Defining the Missing Middle

In 2012, Dan Parolek introduced his recently coined term, “Missing Middle Housing,” in an article in *New Urban News* (now, *Better! Cities & Towns*). The architect, urban designer, and principal of Berkeley planning and design firm, Opticos Design, partnered a brief summary of the mismatch between an increasing market demand for compact living and the currently constructed housing in the U.S. with an impassioned plea for readers to “stop talking about the problem and start generating solutions!” (Parolek, 2012). In Parolek’s view, these solutions rest on the resurrection of the moderate-density housing typologies – duplexes, fourplexes, mansion apartments – that had been a major component of our housing stock prior to World War II but have since fallen off the development radar in favor of single-family and larger multi-family homes. This shift away from these structures has resulted in the bifurcation of the housing landscape into a dichotomy of sprawl and skyscrapers – low-density suburban tract development unable to support walkability, neighborhood retail, or transit versus imposing, high-density structures that make more efficient use of land but are out of scale with existing suburban developments and are therefore politically tortuous to develop in the very locales the density they bring is needed.

In the years since Parolek’s first article, the concept of Missing Middle housing has gained an increasing amount of traction in planning and design circles (Hertz, 2015; Hurley, 2016; Lewyn, 2016) and popular news media (Clark, 2017; Saunders, 2016). It’s also garnered institutional attention both from unsurprising allies such as smart growth advocates (Smart Growth Online, 2016) and New Urbanists (Congress for the New Urbanism, n.d.) and more unexpected organizations including the National Association of Realtors (Broberg, 2016) and even the AARP (Abrahms, 2016). Discussions of Missing Middle housing have made their way into local policy in traditionally progressive cities like Portland (Bureau of Planning and Sustainability, 2016) and Austin (Tomko, 2015), and even the small towns of exurban Detroit (AIA Michigan, 2015). However, academic literature has not yet broached the subject of the Missing Middle, though the concepts of its main tenets – smart growth, housing mix, walkability, regulation and urban design – have certainly been explored in depth.

This chapter outlines the two distinct components of Missing Middle housing – “middle” and “missing.” I begin by illustrating the typologies to which the term refers, enumerating the purportedly beneficial characteristics of these typologies according to Missing Middle advocates, and relating these characteristics to existing urban design and planning literature. I then describe the Missing Middle’s absence from the newly constructed national housing stock, provide an overview of changing demographics and housing demand preferences that may lead to its revival, and explore the currently understood barriers to the development of these typologies.

The “Middle”

The Types

In addition to incorporating the principles of Missing Middle housing in Opticos’ design and planning work and spreading the word via blog posts and interviews, Parolek, his wife, Karen, and others on the Opticos team maintain an online Missing Middle information clearinghouse that hosts definitions, resources, and insights related to the design, development, and regulation of these typologies. According to the site, Missing Middle housing consists of “a range of multi-unit or clustered housing types compatible in scale with single-family homes that help meet the growing demand for walkable urban living” (Missing Middle, 2017). As seen in Figure 2.1, the scale of these structures falls between that of the standard, single-family detached house and larger, mid- or high-rise multi-unit apartment or condominium complexes.



Figure 2.1: Missing Middle housing types (Missing Middle, 2017)

Within this spectrum, the following housing types feature most prominently according to Parolek

(N.B. all housing type descriptions are **direct quotes** from Missing Middle, 2017 unless otherwise noted):

Duplex: Side-by-Side

A small- to medium-sized structure that consists of two dwelling units, one next to the other, both of which face and are entered from the street.



Figure 2.2: Duplex: Side-by-Side (Missing Middle, 2017)

Duplex: Stacked

A small- to medium-sized structure that consists of two stacked dwelling units, one on top of the other, both of which face and are entered from the street.



Figure 2.3: Duplex: Stacked (Missing Middle, 2017)

Bungalow Court

This building type consists of a series of small, detached structures, providing multiple units arranged to define a shared court that is typically perpendicular to the street. The shared court takes the place of a private rear yard and is an important community-enhancing element.



Figure 2.4: Bungalow Court (Missina Middle, 2017)

Carriage House

An accessory structure typically located at the rear of a lot providing space for a small residential unit, home office, or other small commercial or service use. This unit could be above a garage or at ground level.



Figure 2.5: Carriage House (*Missina Middle, 2017*)

Fourplex

A medium structure that consists of four units: typically two on the ground floor and two above with a shared entry.



Figure 2.6: Fourplex (*Missing Middle, 2017*)

Multiplex: Small

A medium structure that consists of five to 10 side-by-side and/or stacked dwelling units typically with one shared entry or individual entries along the front.



Figure 2.7: Multiplex: Small (*Missing Middle, 2017*)

Townhouse

A small- to medium-sized structure, consisting of two to eight (usually) attached single-family homes placed side by side.



Figure 2.8: Townhouse (*Missing Middle, 2017*)

Live/Work

A small- to medium-sized attached or detached structure consisting of one dwelling unit above or behind a flexible ground floor space for residential, service, or retail uses. Both the primary ground-floor flex space and the second unit are owned by one entity.



Figure 2.9: Live/Work (*Missing Middle, 2017*)

Courtyard Apartments

A medium- to large-sized structure consisting of multiple side-by-side and/or stacked dwelling units accessed from a courtyard or series of courtyards. Each unit may have its own individual entry, or up to three units may share a common entry.



Figure 2.10: Courtyard Apartments (*Missing Middle, 2017*)

In addition to the types laid out by Parolek on the Missing Middle website and described above, I argue the following typologies can also be said to fall into the Missing Middle range due to their design and density characteristics:

Triplex/Triple-Decker/Three-Decker

“A small walk-up apartment building, lying on its own lot, that consists of three apartments vertically stacked one above the other, each one occupying one entire floor and each one including, at the minimum, a rear covered porch” (Wegmann, 2006, p. 10).



Figure 2.11: Three-Deckers in Worcester, MA (Bilis, 2016)

Attached Accessory Dwelling Unit

Similar to the carriage house, attached ADUs are intended to serve as secondary rental units within single-family homes (as opposed to separated or garage-related structures). They require a separate entrance and can be located in a basement or attic or simply attached as an addition to the main structure (Isthmus Research, 2013).



Figure 2.12: Attached Accessory Dwelling Unit in Semi-Basement (Isthmus Research, 2013)

Skinny Homes

Though essentially just small single-family detached homes on small lots, skinny homes have been viewed by planners and designers (especially in Portland, OR) as a method for increasing density without sacrificing neighborhood character or the benefits of detached units (HUD User, n.d.).



Figure 2.13: Skinny Homes from Portland's Living Smart Program
(HUD User, n.d.)

Figure 2.14 shows illustrations by Opticos of idealized versions of several of the types described above and lists some basic site and building metrics. Most structure types are similar in scale and density.



Type	Duplex: Side-by-Side	Bungalow Court	Fourplex	Multiplex: Small
Lot				
Width (ft)	40-75	100-150	50-75	50-75
Depth (ft)	100-150	100-150	100-150	100-150
Area (acres)	0.10-0.25	0.25-0.50	0.10-0.25	0.10-0.25
Units				
# of Units	2	5-10	4	6-10
Unit Size (sf)	600-2,400	500-800	500-1,200	500-1,200
Density				
Net DU/Acre	8-20	20-35	15-35	25-70
Parking				
On-Street	2-3	5-7	2-3	2-3
Off-Street	1/unit	0-1/unit	1.5/unit	1.5/unit
Setbacks				
Front (ft)	10-25	10-25	10-25	10-25
Side (ft)	5-12	5-15	5-12	5-12
Rear (ft)	30-60	5-15	30-60	10-20
Building				
Width (ft)	28-55	18-24	36-56	36-56
Depth (ft)	28-60	24-36	32-60	32-60
Height (ft)	20-24	12-14	20-24	20-24

Figure 2.14: Selected Missing Middle Housing Type Metrics
(Images & Data Adaptation from *Missing Middle*, 2017)

Related Concepts

Clearly, these typologies are not novel innovations or unique to the concept of Missing Middle. In fact, several related concepts touch on similar or interconnected ideals. While these related topics are not the focus of this thesis, they are worth mentioning both to show the breadth of discourse on this subject and to differentiate them from the particular tenets of the Missing Middle.

Gentle Density

Almost identical to Missing Middle housing types, Gentle Density is a Canadian concept that describes “attached, ground-oriented housing that’s more dense than a detached house, but with a similar scale and character” (Toderian, 2017). The specific references to “attached” and “ground-oriented” exclude any of the clustered detached or stacked Missing Middle typologies in favor of models like side-by-side duplexes and townhouses. Further, established alongside Gentle Density in Vancouver’s EcoDensity Charter are the concepts of Invisible Density (akin to attached accessory dwelling units) and Hidden Density (akin to carriage houses or other detached, rear-yard ADUs) which are even less obtrusive methods of densifying existing neighborhoods (Isthmus Research, 2013).

Gentle Infill

Gentle Infill advocates focus on promoting primarily accessory dwelling units (both attached and detached) and skinny homes in existing single-family neighborhoods as a method of improving affordability and as a way of combating rampant housing price appreciation (McCormick, 2016). As indicated by the title, the expressed goal of Gentle Infill proponents is to encourage infill in existing communities, whereas Missing Middle typologies have also been advocated in greenfield developments.

Low-Rise High-Density Housing

Originally conceived in the 1960s and 1970s as an alternative to Corbusian “towers in the park,” low-rise high-density dwellings were intended to increase urban densities while maintaining the open space, light, and ground-orientation of suburban housing forms (Wirth, 2013). However, unlike Missing Middle housing types, these models usually took the form of larger, slab-like complexes and were most common outside the U.S. with the notable exception of the Marcus Garvey Village low-income housing project in Brooklyn, NY.

Workforce Housing

As we will see below, one proposed benefit of Missing Middle housing is the creation of naturally affordable units, that is, units that are affordable to middle class and lower middle class households without the need of deed restrictions. Similarly, Workforce Housing refers to units aimed at households earning 60 to 100 percent of area median income, or AMI (Urban Land Institute, 2010).

While Workforce Housing does not conform to any particular physical form, it shares the Missing Middle's goal of addressing an underserved "middle" – though in terms of income rather than density.

Characteristics

By occupying a low-to-medium scale of development but moderate-to-high densities, Missing Middle housing types can provide some of the benefits of higher density living in a form that is accessible to suburban residents' proclivities for preserving neighborhood character. The Missing Middle website lays out several key characteristics of Missing Middle housing. While the site appears to put all of these characteristics on equal footing, it may be more constructive to consider them in terms of *structural* versus *contextual*. That is, some characteristics of the Missing Middle are inherent to the housing types listed above whereas others are only applicable if these units are developed in certain neighborhoods or in conjunction with other development types or particular regulations. While the concept of Missing Middle housing is absent from existing academic literature, these characteristics have been explored by researchers in other contexts. The following descriptions explain the elements of Missing Middle housing according to its advocates and relate these elements to applicable concepts from previous housing, urban design, and land development studies.

Structural Characteristics

The structural characteristics of Missing Middle housing include small building footprints, lower perceived densities, smaller units, and simple construction. These elements combine to allow Missing Middle structures to be developed in suburban contexts at affordable prices while simultaneously increasing neighborhood dwelling unit densities.

Small Building Footprints

Small building footprints and relatively short building heights enable Missing Middle housing types to be constructed on lots previously zoned for single-family homes while corresponding to existing surrounding development. This allows for incremental neighborhood infill and a more subtle mix of housing types, and therefore social and demographic classes, while maintaining neighborhood character (Missing Middle, 2017).

Although mixing housing types to encourage neighborhood socio-economic diversity is often a goal of planners, Perrin and Grant (2014) found that individual differences at the block level were often barriers to deeper social connections, especially between homeowners and renters or members of different races. These findings may hinder the ability of Missing Middle typologies to bridge intra-

neighborhood socio-economic divides despite their ability to formally blend in with traditional suburban development.

What's more, while Missing Middle advocates clearly see a benefit in an incremental approach to suburban densification through infill, a position shared by those promoting Gentle Density and Gentle Infill development as well, some urbanists believe larger sites ought to be the focus. In *Retrofitting Suburbia* Ellen Dunham-Jones and June Williamson "contend that large projects are needed to achieve the critical mass necessary to induce behavioral change and evolution of the larger transportation, regulator, and market systems" (Dunham-Jones & Williamson, 2009, p. viii). They specifically concentrate on sites 40-acres and above because, in their view, the "zoning codes and land use practices that produced the conventional suburban form of the twentieth century are simply too entrenched and pervasive for piecemeal, incremental projects to adequately improve the sustainable performance of suburbia as a whole" (Dunham-Jones & Williamson, 2009, p. viii).

Lower Perceived Densities

Perhaps the most critical marker of Missing Middle housing is its ability to deliver high dwelling unit densities packaged in a suburban-style building envelope. Thus, as advocates argue, Missing Middle densities "create a supportive environment for transit and neighborhood-serving main streets" without "look[ing] like dense buildings" (Missing Middle, 2017).

Indeed, with net densities ranging into the 30 units-per-acre range and higher, Missing Middle housing is clearly able to achieve high densities within small footprints. These densities are in line with those needed to support several kinds of transit, a major claim of Missing Middle advocates (Puget Sound Regional Council, 2015).

Still, the varied methods of measuring density and the different ways that density is perceived make discussions of neighborhood improvement through increased density difficult. As Forsyth points out, any considerations of density must be clear in terms of several elements. First, as most densities are reported in ratios, inconsistencies in either the numerator (people, dwelling units, square footage) or the denominator (parcel, block, neighborhood) can drastically alter the meaning and effectiveness of such measures (Forsyth, 2003).

When considering the density unit of interest, the numerator, there are three essential variants of density measurements: Floor Area Ratio (FAR), dwelling unit density, and population density (Density Atlas, 2011). FAR tells us the density of built space or how much building mass exists in an area, which can be important when considering visual character, views, and access to air and sunlight. However, it does not inherently divulge any information about how many people are able to occupy

the land. On the other end of the spectrum, population density tells us only how many people exist within a given area. This, conversely, is a good measure of land use efficiency, but tells us nothing about the built environment. What's more, while population density limits are often intended to prevent overcrowding, they are difficult to enforce without constant inspection. The compromise, then, is measuring dwelling unit density. By understanding the number of dwelling units in an area, we can have some insight into both building mass and population totals since dwelling unit sizes fall into some predictable (and often regulated) range and households (defined as the people occupying a single dwelling unit) also have well-measured average size ranges. Still, reporting densities only in terms of dwelling units can be misleading when unit sizes and household sizes are not reported as well.

In terms of a density measurement's denominator, there is the question of how much land to include. Measuring only the land of the parcel will yield the highest reported density, but is a misleading figure when the neighboring parcels are of a considerably different density. Expanding our area to include the entire block averages out these differences but does not take roadways or public open spaces into account – a particularly important consideration for clustered housing types like Missing Middle's bungalow courts. If we continue to increase the area of interest to the entire neighborhood or even the whole city, we get a better understanding of how transit- and walk-supportive the area is, but we also include large non-residential areas that will drive down our measured density. As Forsyth indicates, even using terms like "net" and "gross" to define the density we're reporting is not enough because while net densities are assumed to exclude some component of the denominator, the scale at which density is reported will determine what those exclusions are, making more specific labels of density measurement critical. The Missing Middle density measurements listed throughout this thesis are indicated in net dwelling units-per-acre at the parcel level. While this certainly may over-report their impact, measuring density in this way indicates what the density of a neighborhood comprised of Missing Middle types would be while also showing the incremental added density in the case of a Missing Middle structure being inserted into an existing low-density block or neighborhood.

Finally, in any discussion of Missing Middle's merits, it is important to understand the differences between measured densities and perceived densities. In Rapoport's discussion of perceived density, objective measurements of density are always filtered through our normative value systems, resulting in affective, or perceived density (Rapoport, 1975). These perceived densities vary by the environment in which we experience them (e.g. a residential neighborhood vs a shopping district), the building forms that house them (e.g. low-rise vs high-rise), and the behavioral artifacts of the

population in question (e.g. traffic, noise, activity). Therefore, while Missing Middle housing types certainly have lower perceived densities in terms of building forms, the resulting traffic increases (vehicular or pedestrian) from increasing neighborhood population may counteract this perception, especially in districts unaccustomed to such activity.

Smaller Units

Missing Middle housing types rely on small units to increase dwelling unit densities within confined building footprints, but also to “help developers keep their costs down and attract a different market of buyers and renters who are not being provided for in all markets” (Missing Middle, 2017). At first blush, advocates’ belief that latent demand for smaller units exists appears to be unfounded. In fact, median single-family home sizes reached an all-time high of 2,540 square feet nationwide in 2015 after a brief decline during the Great Recession of the late 2000s and early 2010s (U.S. Census Bureau, 2016). National median condo unit sizes, however, appear to have peaked in 2012 at 1,466 square feet and fell to 1,408 square feet in 2015, while multifamily rental unit sizes have remained relatively constant over the past 15 years (U.S. Census Bureau, 2016). One way of explaining this contradiction is that the “primary reason for the reversal in home size [towards larger units] actually built has to do with buyers’ ability to access credit” (Building Online, 2013). That is, because of stricter credit lending policies post-Recession, low-income buyers who are more likely to purchase smaller homes, have largely been locked out of the market, resulting in only larger, more expensive homes being purchased or built. These statistics, partnered with an analysis of a recent National Association of Home Builders preference survey indicate that preferred home sizes may indeed be shrinking, at least among older buyers (Building Online, 2013) and younger ones (Siniavskaia, 2014).

Claims of benefits to builders from small unit construction may be harder to believe. While total construction costs, measured in \$/sf, indeed increase with more square footage, the *marginal* cost of construction actually decreases due to the economies of scale. That is, a larger unit, all else equal, will indeed cost more to build than a smaller unit, but it will cost less on a per square foot basis than a smaller home due to the relative importance of “fixed” elements like kitchens and baths in cost breakdowns. The larger unit will also likely sell for disproportionately more, which is why builders tend to build as large of a unit as they are allowed to by zoning – their increased costs will result in increased returns (Green, 2017).

Simple Construction

Missing Middle types are wood-framed, Type V construction and do not contain expensive peripherals like fire-rated separation, structured parking, or elevators. This makes them cheaper to build on a per unit basis than many larger multi-family structures (Missing Middle, 2017). However, due to high land acquisition costs, developers will prefer to build as many units as possible on a parcel to maximize per-unit profits (Roth, 2017), resulting in larger, more expensive structures and units on land currently zoned for multi-family. Still, advocates point to the inherent affordability of Missing Middle structures as a reason to promote their development in place of single-family homes. Indeed, due to their simple construction, these units can be undertaken by smaller, more single-family-oriented builders. Therefore, instead of expecting larger multi-family developers to forego additional profits by building smaller Missing Middle structures, advocates believe that allowing Missing Middle development in single-family neighborhoods will create more affordable units that can be built by traditional builders who will see an incentive to build such structures due to the increased land residuals.

Contextual Characteristics

The contextual characteristics of Missing Middle housing include a walkable context, fewer off-street parking spaces, creation of community, and marketability. While these characteristics are important to the larger adoption of Missing Middle housing, they are not inherent in the forms themselves and must be ensured through other regulations or in partnerships with other development types.

Walkable Context

Parolek states “Missing Middle housing types are best located in a walkable context. Buyers and renters of these housing types are often trading square footage for proximity to services and amenities” (Missing Middle, 2017). Indeed, research has indicated that consumers are willing to trade larger lots and homes for better access to work, shopping, and other amenities (Litman, 2016). However, simply increasing residential densities does not suffice to create walkability. Instead, mixing of land uses, access to transit, and improvements to the pedestrian realm are also required to make a neighborhood walkable (Lo, 2009). Therefore, while Missing Middle housing may contribute to walkability and certainly is easier to sell when located in a walkable neighborhood, it is important to point out that small multi-family units are not all that is needed to create walkability.

Fewer Off-street Parking Spaces

Again, advocates point to Missing Middle's transit- and walkability-supportive densities to suggest that "Missing Middle housing types should not provide more than one parking space per unit" (Missing Middle, 2017). While vehicular use does indeed decrease with increased residential density (Brownstone & Golob, 2009), other investments in transit and walkability are also needed to decrease vehicle ownership and usage rates. Additionally, though Missing Middle densities can support non-auto-oriented lifestyles, they do not inherently remove the need for cars in neighborhoods where other travel modes are not available. Therefore, promoting their development because they require fewer off-street parking spots is somewhat disingenuous. Instead, it may be more accurate to say that if a community desires to create a community that does not heavily depend on car trips but still prefer suburban-style housing envelopes, Missing Middle housing is an important step towards that realization.

Creates Community

This is likely the most dubious claim by Missing Middle advocates. While increased densities combined with human-scale building types can be important parts of "vibrant neighborhood[s] with places to eat, drink, and socialize" (Missing Middle, 2017), the housing units themselves do not accomplish this feat. In addition to the concerns of social mixing through housing type diversity brought up by Perin and Grant mentioned earlier, Bramley and Power find that "[m]ore dense (compact) urban forms, and their associated housing types, tend to be associated with somewhat worse outcomes in relation to dissatisfaction with the neighbourhood and perhaps more strongly with the incidence of neighbourhood problems" (Bramley & Power, 2009, p. 46). Still they also find that increased densities result in greater access to amenities and further clarify that density's negative impact on social sustainability is at least somewhat explained by the high correlation (but not causation) between poverty and high-density. Therefore, while incrementally increasing density from single-family detached homes to Missing Middle typologies can support a more amenity-rich community structure, there is no guarantee that such a transformation will occur, and if it does, it certainly cannot solely be attributed to the construction of small multi-family units.

Marketable

Perhaps Missing Middle advocates' most crucial claim is the marketability of these housing types. They state:

Because of the increasing demand from baby boomers and millennials, as well as shifting household demographics, the market is demanding more vibrant, sustainable, walkable places to live. These Missing Middle housing types respond directly to this demand. In addition, the scale of these housing types makes them more attractive to many buyers who want to live in a walkable neighborhood, but may not want to live in a large condominium or apartment building. (Missing Middle, 2017)

As will be explored later in the chapter, demographic trends and shifting consumer preferences are pointing towards a growing demand for compact development without sacrificing too many benefits of the suburbs. Missing Middle typologies would be a great fit for this increased demand.

What is also worth mentioning is the marketing savvy of Missing Middle advocates themselves. Much like the New Urbanists before them who recognized that getting builders and developers on board with their designs would increase the prominence of the movement, Missing Middle advocates have clearly understood the power and spread of this kind of messaging. This is apparent in the many blog posts, popular media articles, and in-person workshops Parolek participates in and is best epitomized by his penning of a Missing Middle article in an issue of the National Association of Home Builder's *Best in American Living* magazine (Parolek, 2014). In this way, not only are the characteristics of Missing Middle housing marketable, but so is the concept itself.

The “Missing”

In addition to espousing the beneficial characteristics of Missing Middle housing types, advocates also work to illustrate the dearth of such housing in newly constructed stock. Indeed, by referring to the middle as “missing,” they also imply that we *ought* to see these units being constructed and are surprised to find that they are not. This belief is rooted in two important realities. The first is that Missing Middle housing types used to comprise a larger proportion of new units than they currently do, a conjecture borne out by national housing data. The second is that a resurgence in this form of development is required to keep pace with growing demand, a claim that is similarly supported by

national demographic and preference trends. After illustrating these two foundational components of just how missing the middle is, I will enumerate the reasons for the decline of these housing types and the currently understood barriers to their development.

The Disappearance of the Middle

This section traces the decline of Missing Middle housing types at the national level. I begin by exploring data related to existing housing stocks, showing that attached single-family and small multi-family structures, while uncommon at the national level, have strong heritages in certain older cities. I continue by exploring three datasets related to new construction, building permits, housing starts, and housing completions, to show the relative paucity of these structures in new development.

Existing Housing

As Missing Middle advocates note, these moderate density housing types are an uncommon choice for new development; however, this was not always the case. A recent Washington Post article explored data from the 2014 American Community Survey (ACS) for the 40 largest U.S. cities by population to determine the share of occupied housing units by structure size (Badger & Ingraham, 2015). Figure 2.15 is a graphic from the article that illustrates their findings.

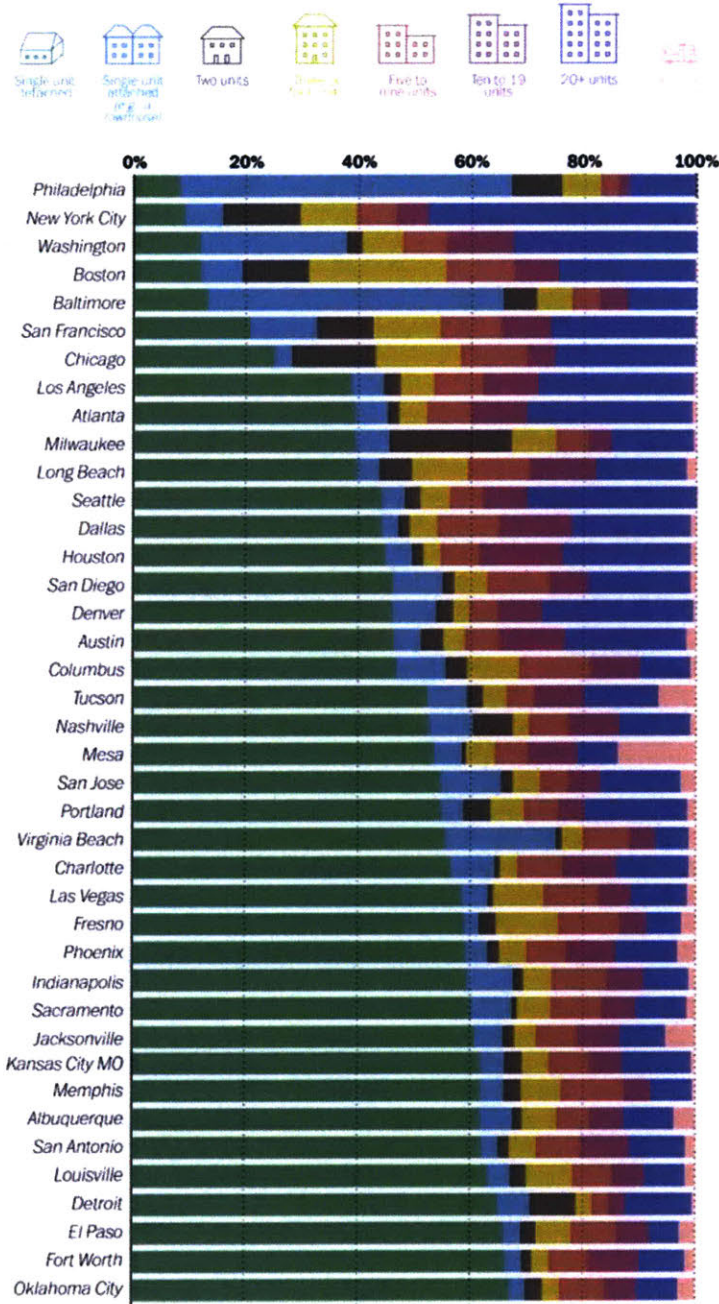
While a majority of cities are comprised mostly of single-family detached homes, there are several notable exceptions. New York, perhaps unsurprisingly, finds nearly half of its units in 20+ unit structures. Several older, industrial cities in the Northeast and Midwest, however, have relatively large proportions of Missing Middle housing. Philadelphia, Baltimore, and Washington, D.C. are marked by large percentages (25-60%) of attached single-family units – townhouses, rowhouses, and the like – while 20-30% of occupied units in Boston, Milwaukee, and Chicago are in 2-4 unit structures.

When considering unit counts nationwide, however, these figures appear even more exceptional. According to the 2015 ACS, of the over 133 million total housing units in the U.S. a whopping 61.6% are single-family detached, while 18.7% exist in Missing Middle type structures (single-family attached and multi-family with 2-9 units), and 13.2% are in large multi-family buildings. Even mobile homes make up a larger share (6.4%) of units than each of single-family attached (5.8%), 2 unit (3.7%), 3-4 unit (4.4%), or 5-9 unit (4.8%) structures (U.S. Census Bureau, 2015).

The Washington Post

The way we live, city by city

Occupied housing units, by building type



WAPQ ST, WONKBLOG
 Source: U.S. Census Bureau, American Community Survey
 Icons by Martin Lebreton and Arthur Shlain, The Noun Project

Figure 2.15: The Washington Post's Chart of Occupied Housing Units by Structure Size (Badger & Ingraham, 2015)

Analyzing existing home types via a slightly different dataset allows us to understand when these units were built. Using 2015 American Housing Survey data distributed by the U.S. Census Bureau, we can explore existing housing units via custom cross-tabulations. Figure 2.16 illustrates existing housing units broken down by year built and structure size. While most structure types have similar distributions of ages, 2-4 unit structures, a key component of the Missing Middle, are shown to have largely been built prior to 1939 with over 30% of such units built during this period. What’s more, only 10% of existing units in 2-4 unit structures were built in the 21st century, or around half the proportion of other units during the same span.

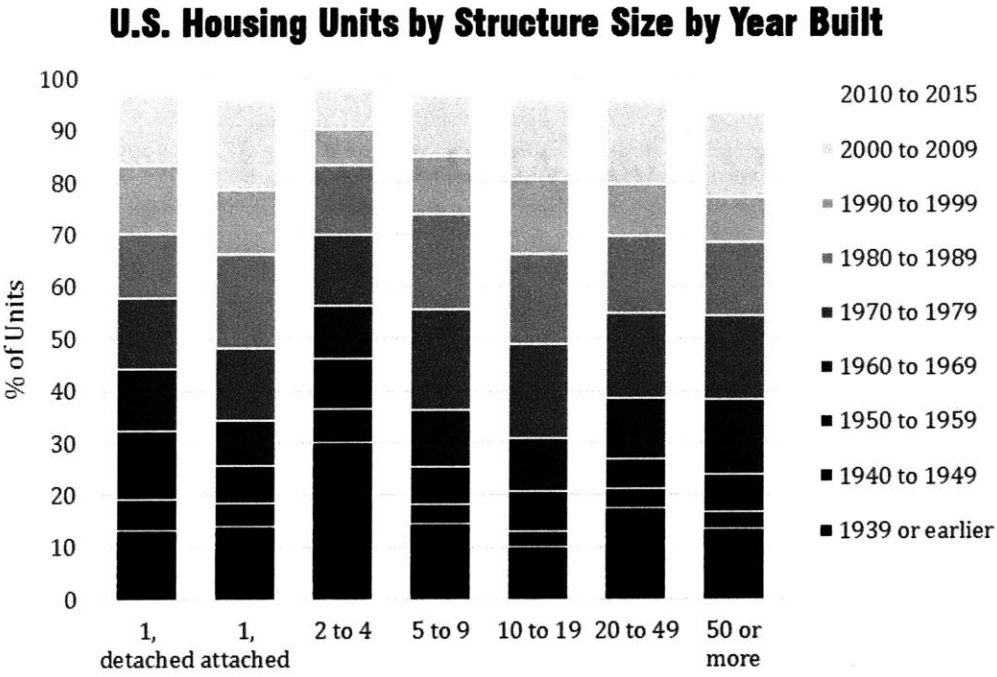


Figure 2.16: Existing U.S. Housing Units by Structure Size by Year Built
(Data from 2015 American Housing Survey)

When we look at the same data in another light, namely breaking down units first by year built and *then* reporting the share of each structure type, we see that the dwindling representation of Missing Middle typologies in the more recently constructed housing stock is largely due to an increase in large multifamily construction (Figure 2.17). In fact, aside from a noticeable, yet temporary increase after World War II, the share of single-family housing has remained relatively constant throughout the decades, hovering at around 60%.

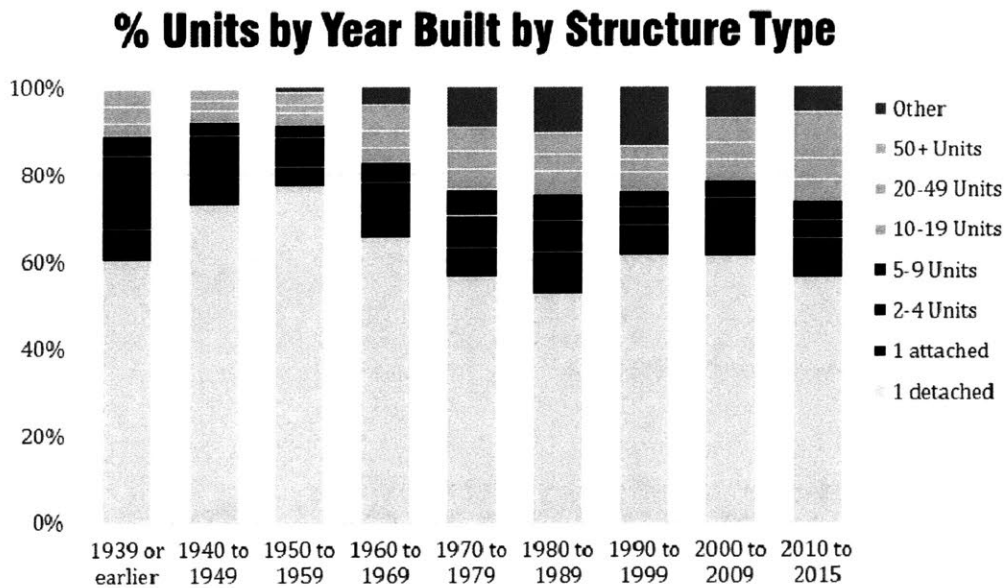


Figure 2.17: Existing U.S. Housing Units by Year Built by Structure Size
(Data from 2015 American Housing Survey)

This finding could indicate that the historical rate of constructing Missing Middle typologies was due less to demand and more to the fact that these units were inexpensive and simple ways to construct many units at a time when the country was rapidly urbanizing. That they have been replaced by units in larger structures may point to the economies of scale of building larger units, paired with a relatively constant demand for single-family homes. However, the squeezing of the Missing Middle types in recent years could also point to a bottleneck in the densification process. Namely, while dense areas are able to grow denser through the construction of larger multifamily structures, suburban landscapes that could grow incrementally through smaller multi-unit development are prevented from doing so by restrictive land use regulations.

New Construction

Though Missing Middle housing types are clearly not entirely absent from existing housing stocks, their proportions are much lower when viewing data on new construction. With any new construction, there are three critical steps in the development process, securing a building permit for the right to develop, starting construction, and completing the development. The following sections illustrate the trends in these Missing Middle development as related to these three processes. Unfortunately, this data is only available for years from 1959 (or later) onwards. Therefore, a more careful analysis of prime Missing Middle construction years is not possible.

Building Permits

The U.S. Census collects and distributes data on building permits for new construction for a variety of geographies through the Building Permits Survey. These data are collected via a self-reported survey of local building permit officials from all permit-issuing jurisdictions. National level data is broken down by the number of units in each structure (1 unit, 2-4 units, and 5+ units) and by geographic regions (Northeast, Midwest, South, and West) and are reported both annually and monthly (U.S. Census Bureau, n.d.a). While Missing Middle housing types can refer to 1-unit structures when attached or clustered as well as to small-lot 5-10 unit structures, due to the reporting methodologies of the Building Permits Survey, I will use 2-4 unit structures to represent Missing Middle types. Clearly, this will under-report their share, but it will serve to show the relative decline in some of Missing Middle's core typologies.

As seen in Figure 2.19, after decades in the upper single digits and a peak of 10% in 1981, the share of units in 2-4 unit structures has gradually declined to below 3% nationally. With the exception of a surge in large multi-family's share in the late 1960s and early 1970s, single-family homes have dominated the new construction permit landscape, though a post-Great Recession spike in multi-family may be changing that trend.

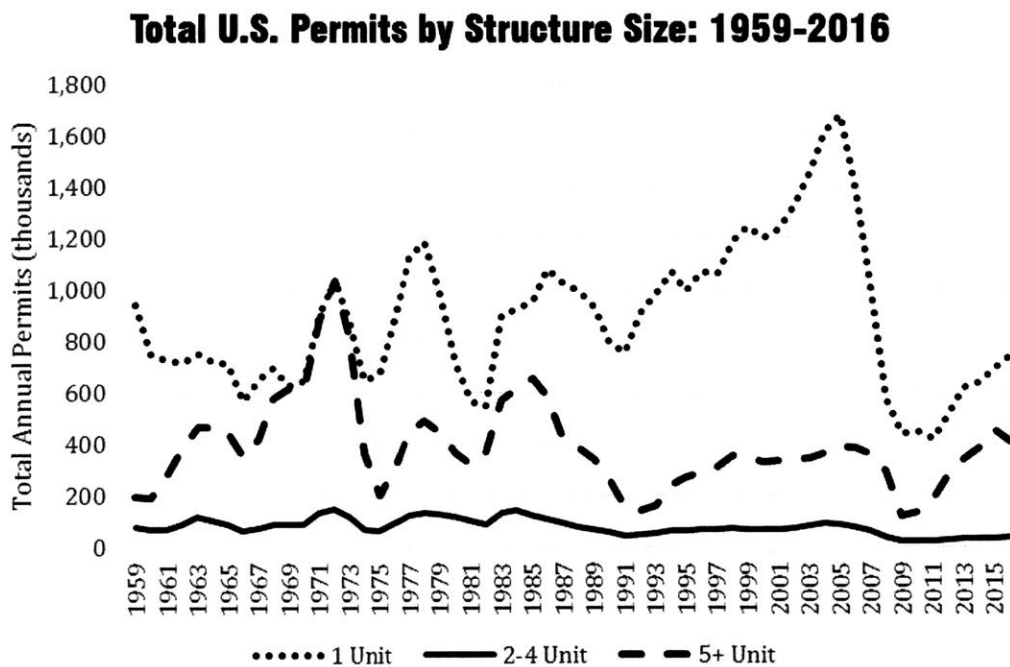


Figure 2.18: National Total Building Permits by Structure Size
(Data: Building Permits Survey, U.S. Census Bureau, 2017b)

Share of U.S. Permits by Structure Size: 1959-2016

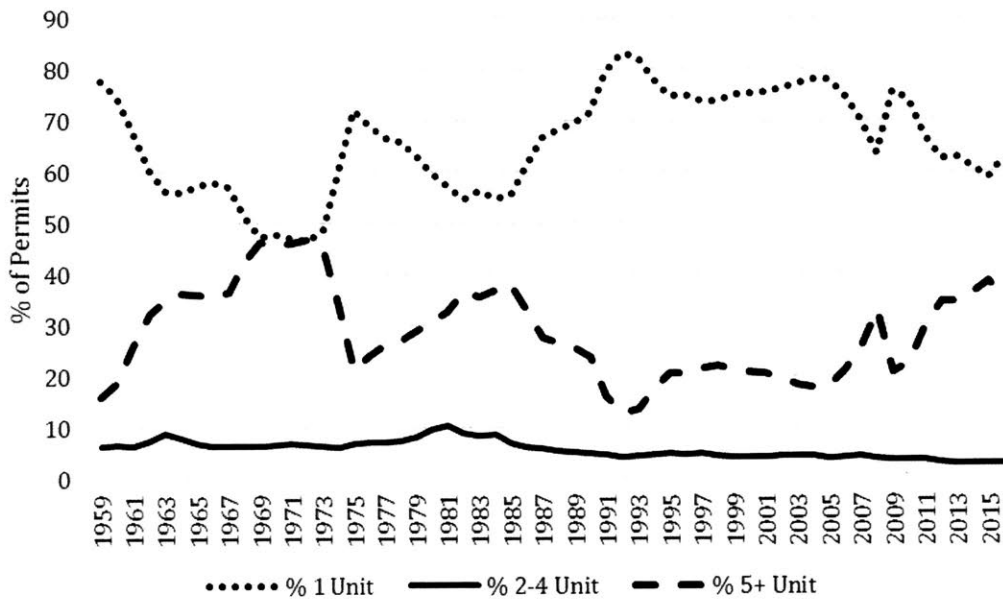


Figure 2.19: National Share of Building Permits by Structure Size
(Data: Building Permits Survey, U.S. Census Bureau, 2017b)

Figure 2.18 comes from the same dataset but shows the trends in total permits issued. Here, we see that despite the low absolute numbers of permits for units in 2-4 unit structures, cyclical movements affecting single-family and large multi-family units are also reflected in Missing Middle typologies. However, this was drastically subdued during the recent housing boom in the early- to mid-2000s which saw dramatic increases in single-family permitting with only gradual growth in multi-family permitting. Since the implosion of the entire market, single-family and large multi-family permitting have both rebounded at a fast pace while 2-4 unit structures have grown much more slowly.

Housing Starts

Data on housing starts are also collected by the U.S. Census Bureau. The monthly national data used to create Figures 2.20 and 2.21 were distributed by the Federal Reserve Bank of St. Louis (FRED). In addition to adding greater detail due to their (seasonally-adjusted) monthly collection, these housing data are important to show how issued permits continued into actual construction in successive months and years. Again, we see that units in 2-4 unit structures have continued to decrease since the middle of the 20th century, both in terms of total housing starts and as a share of all units.

Data are reported as seasonally-adjusted annual rates, or SAAR. To calculate this rate, the actual monthly rate is divided by the average monthly rate for that year to determine the seasonality ratio. The actual monthly rate is then divided by this ratio and multiplied by 12 to estimate the rate for a hypothetical year composed of 12 months identical to the one in question.

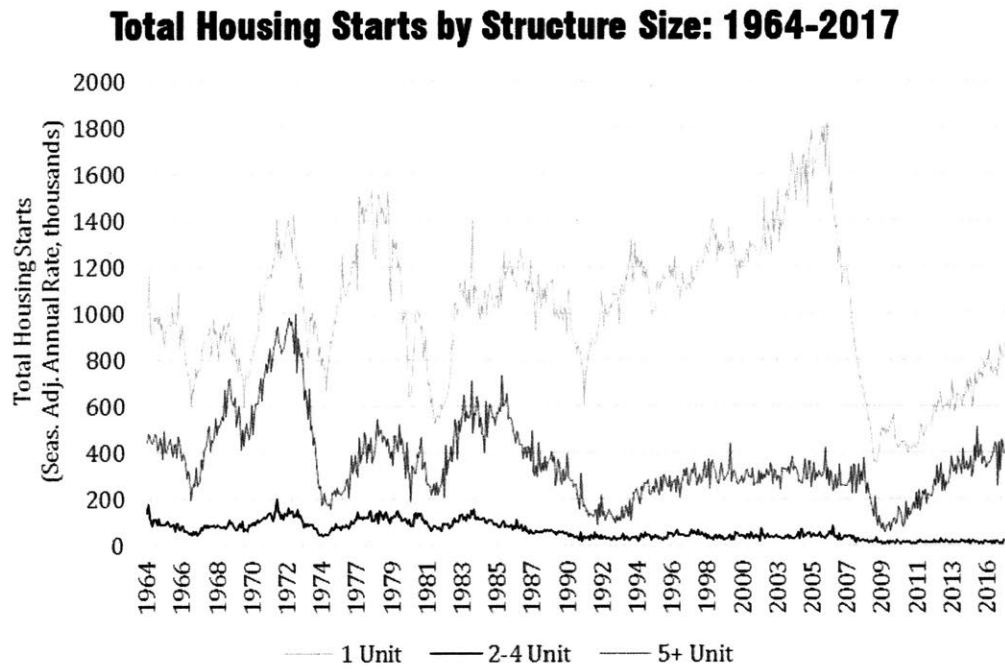


Figure 2.20: National Total Housing Starts by Structure Size
(Data: FRED, U.S. Census Bureau, 2017a)

Share of Housing Starts by Structure Size: 1964-2017

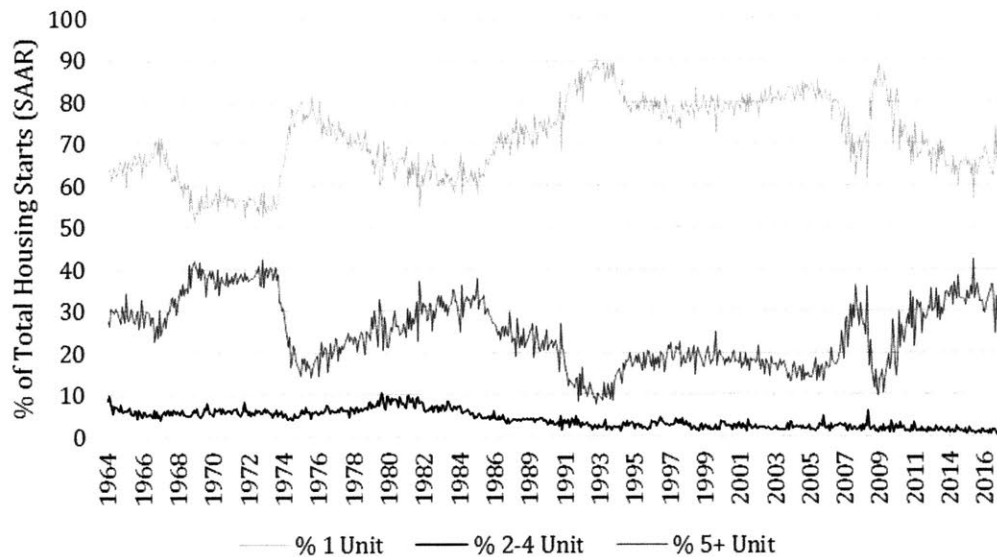


Figure 2.21: Share of National Housing Starts by Structure Size
(Data: FRED, U.S. Census Bureau, 2017a)

Housing Completions

The final piece to new construction is the completion of the structure. Again, the data used to create Figures 2.22 and 2.23 was sourced from the U.S. Census Bureau – this time, from the Characteristics of New Housing survey. While showing a similar decline in 2-4 unit construction as the permits and starts data, the completion data appear to be less impacted by cyclical swings with the exception of major booms and busts. What’s more, as seen in the figures below, single-family homes make up an even more dominant majority of completed units than they do in the starts or permits data. This would appear to indicate that multi-family structures, including those that fall into the category of Missing Middle, are less likely to be carried through from permitting to completion than their single-family brethren.

Total Housing Completions by Structure Size: 1973-2015

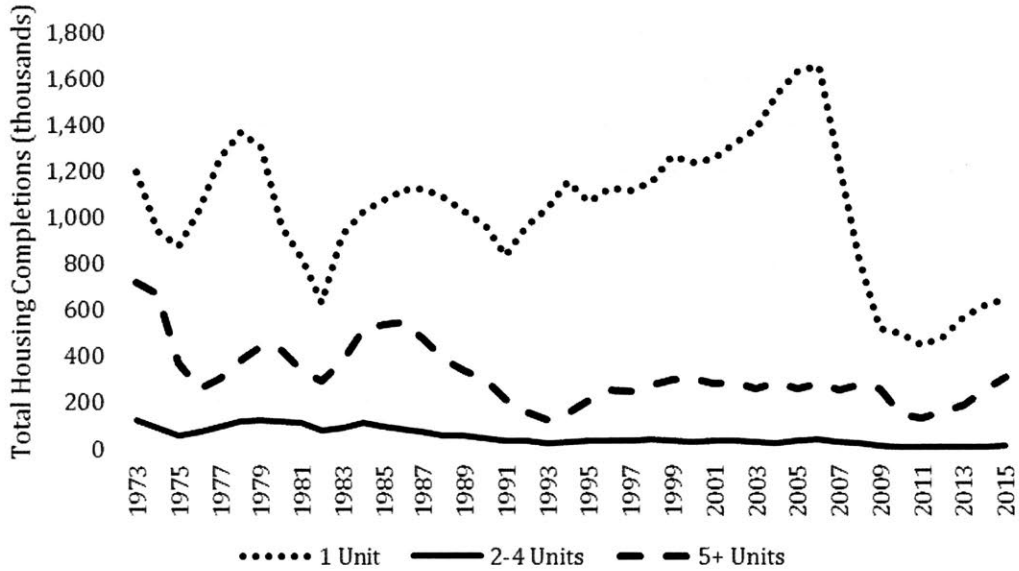


Figure 2.22: National Total Housing Completions by Structure Size
(Data: New Housing Units Characteristics, U.S. Census Bureau, 2015)

Share of Housing Completions by Structure Size: 1973-2015

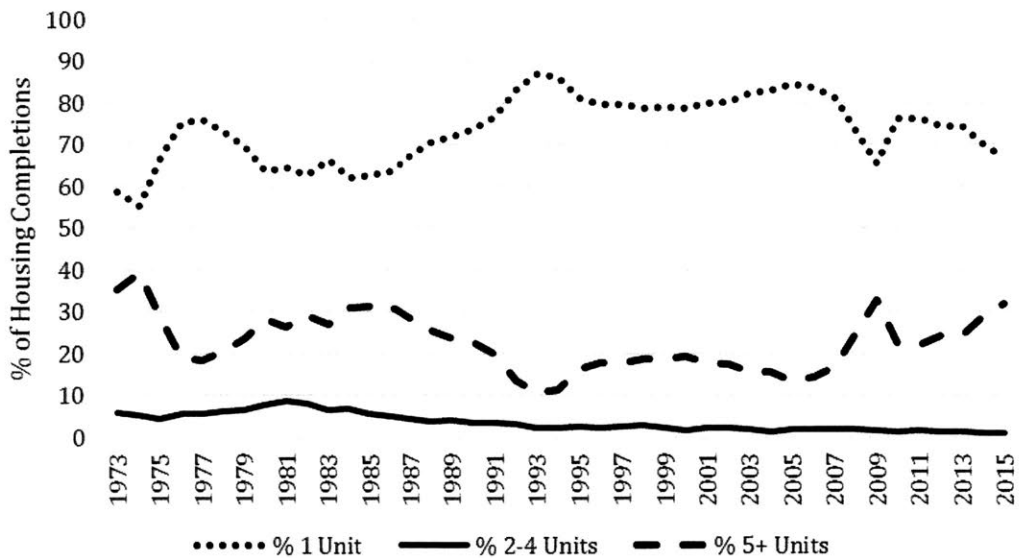


Figure 2.23: Share of National Housing Completions by Structure Size
(Data: New Housing Units Characteristics, U.S. Census Bureau, 2015)

Combined Data

While comparing the permits, starts, and completions for units in 2-4 unit structures to those in single-family and large multi-family structures is helpful to understand relative trends, due to the Missing Middle’s low absolute unit counts, a more detailed analysis is obfuscated by the value disparity in the above charts. Therefore, Figure 2.24 is helpful to illustrate both the more subtle interactions between permits, starts, and completions for Missing Middle structures and the drastic decline of these units over the past 50+ years.

Specifically, the data shows that while annual levels of Missing Middle development hovered around the 100,000 units per year mark in the 1960s and 1970s, plunges during recessions in the late 1980s and late 2000s caused immense drops in production that were never reversed. In fact, while permits of Missing Middle units rebounded after both recessions, this did not translate to built structures, resulting in fewer than 10,000 completions per year of units in 2-4 unit structures over the past five years.

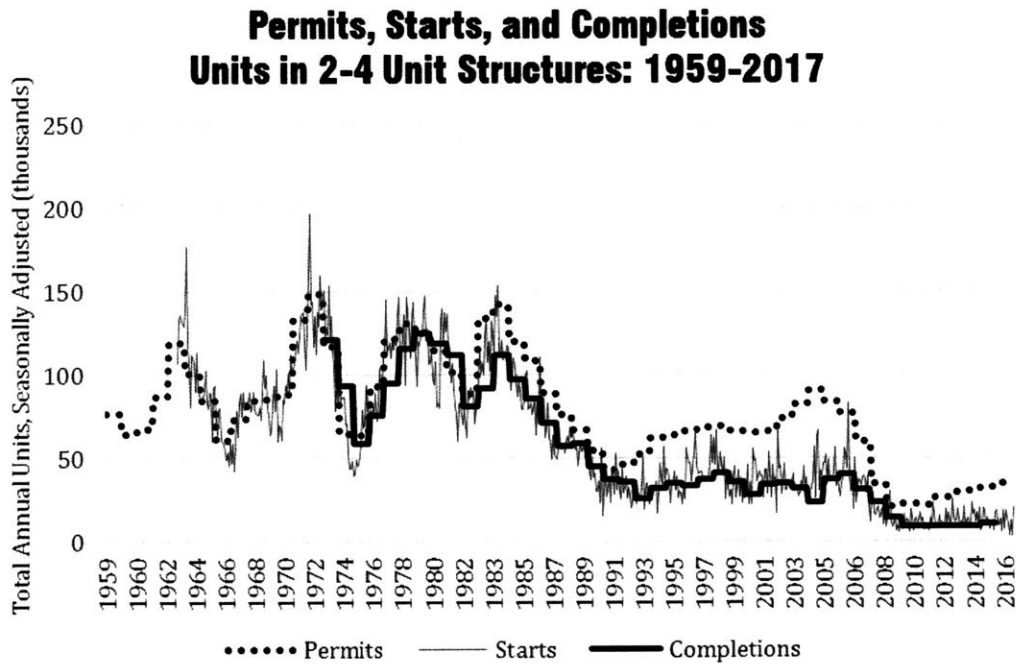


Figure 2.24: Units in 2-4 Unit Structures: Permits, Starts, and Completions
(Data: *New Housing Units Characteristics, U.S. Census Bureau, 2015*)

The Missing Middle's Growing Demand

The middle is not only considered missing because it is no longer being built. In fact, while one might assume that the declining share of Missing Middle housing types in American housing stock reflects consumer preferences, Missing Middle advocates and those who study housing trends more generally suggest that this is not the case.

In *Reshaping Metropolitan America*, demographer Arthur C. Nelson explores how demographic trends and shifting consumer preferences are pointing towards a mismatch between the existing supply of large, single-family homes in auto-oriented suburbs and the growing demand for smaller units and compact, walkable urban environments. This section explores Nelson's findings and relates them to the outlook for Missing Middle units.

Structural Market Changes and Homeownership

Nelson highlights several structural market changes over the past decade that have caused a decline in homeownership levels (Nelson, 2013). Indeed national homeownership rates have fallen to their lowest levels since the early 1990s, reaching just 63.7% at the end of 2016 after peaking at 69.2% in 2004 (U.S. Census Bureau, 2017c). While Missing Middle home types can accommodate either ownership or rental tenures, the decline in ownership may portend a renaissance of more compact and shared living conditions.

Rising energy costs both prior to the Great Recession and after the recovery meant higher costs for both home utilities and commuting. While both homeowners and renters must usually pay utility costs, the larger median size of owner-occupied housing makes it more expensive to maintain than a rental unit. Commuting costs, however, are an even greater disincentive for homeownership since the majority of available for-sale homes are located in auto-oriented suburban environments. Indeed, Nelson points to a Federal Reserve Board study that found an increase in gas prices to correlate with a proportional decrease in home purchase demand (Nelson, 2013, p. 10). What Nelson could not anticipate, however, was the sudden drop in crude oil prices after 2014, which may reintroduce demand for exurban living.

Nelson also points to falling national incomes as a barrier to homeownership. A drop in real incomes has also led to a decline in median family net worth – from \$126,400 in 2007 to \$77,300 in 2010 – and an increase in suburban poverty levels (Nelson, 2013, p. 10).

One potential reason for falling incomes is lagging employment. Due to racial disparities in access to education, underemployment and unemployment rooted in low job-preparedness and sub-

standard levels of education will only get worse as the population's share of racial minorities grows (Nelson, 2013, p. 11).

Perhaps the most critical barrier to new homeownership is the change in lending practices after the Great Recession. After providing low-interest, low down payment loans to new under-qualified homebuyers for years, the mortgage industry was forced to tighten their protocols after the housing bubble burst. Higher credit thresholds and greater demands for down payments locked out many potential homebuyers – including those who had lost their homes during the crash. Stricter lending rules combined with real home value depreciation to make home purchases both unattainable for many and a less attractive investment for even more (Nelson, 2013, p. 13).

Demographic Trends

Nelson also notes that America's changing population makeup will have an important impact on housing choices (Nelson, 2013, p. 20-25). First, America is getting older. Aging Baby Boomers, the post-war generation born between 1946-1964, will cause the share of seniors in the population to rise from 13% in 2010 to 19% in 2030 (Nelson, 2013, p. 17). These aging seniors are also the driving force behind a growing trend in both households without children and single person households.

Additionally, the country's non-white population will grow from 107 million in 2010 to 163 in 2030, an increase of over 50%. This will increase the share of minorities from 34.7% to 43.6%. Minority households will also be the main generator of households with children.

Finally, while average household size has been declining for the past century – from 4.60 in 1900 to 2.59 in 2000 – that trend appears to be stagnating, with an average household size of 2.58 in 2010. Though aging Boomer households are getting smaller due to adult children moving out of the home and Boomers losing their partners due to age, increases in minority populations are able to stabilize household sizes due to higher fertility rates among minority women and higher tendencies for multi-generational living (Nelson, 2013, p. 26). This flattening of household sizes will reduce demand for new housing in the coming decades.

The Rise of Millennials

Also known as Generation Y, Millennials, the largest generation in the country, were born between 1980 and 1995 and as such, are just now entering the age of prime housing demand. While a messaging tug of war exists between those who claim Millennials are moving into urban cores and downtowns in droves (Walker, 2016; Westcott, 2014) or preferring suburbs to cities just like past generations (Morris, 2016; Kolko, 2015), what many studies have shown is that this generation has

a strong affinity for a built environment that is walkable and contains a mix of uses (Litman, 2015). A recent Urban Land Institute survey found that walkability was a primary concern of Millennials, regardless of whether they currently live in urban cores or suburbs and that cost of housing was the most important factor for ranking potential communities (Urban Land Institute, 2015). Still, Millennials also state preferences for larger units than they currently live in (61%) and a suburban environment (48%) for their future homes (Demand Institute, 2014a). These trends indicate that Millennials value affordable, walkable built environments that can also support the open space and privacy of the suburbs, indicating a potential demand for the compact, suburban-friendly housing types of the Missing Middle.

Implications for the Missing Middle

The findings of Nelson and others have several implications for Missing Middle housing types. First, a decline in homeownership rates (and a commensurate increase in rental rates) implies a growing demand for rental units. While these units can take multiple forms – both single- and multi-family – Missing Middle housing types are particular well-suited for this growing demand. As market surveys have shown, “a growing portion [of Americans] would accept more compact housing types, such as townhouses and condominiums, if they provide better neighborhoods, shorter commutes, transportation cost savings or other financial savings” (Litman, 2016, p. 15). What’s more, specific forms of Missing Middle types, such as stacked or side-by-side duplexes are ideal for a kind of split tenancy. That is, while homeownership rates are falling, “most Americans aspire to own a single-family home sometime in their lives” (Litman, 2016, p. 15), making a housing type where one occupant owns the structure and the other, potentially an aging parent or adult child, rents the other unit within it an attractive setup.

Next, as Baby Boomers age, they will increasingly look to downsize their current family-oriented housing units (though perhaps at lower rates than anticipated) while remaining in their communities (Demand Institute, 2014b; AARP, 2014). This portends a need for smaller units in suburban settings that are not dissimilar from existing home styles.

Further, the growing minority population would likely benefit from an increased supply of Missing Middle housing types for two reasons. First, with racial and ethnic disparities in educational attainment, earning levels, and wealth accumulation, minority households are less likely to be able to afford the large suburban homes of the past half-century, but still desire family-oriented units in suburban settings. Second, due to higher propensities for multi-generational living among these

populations, units that incorporate separate, but proximate units (duplexes, triplexes, carriage houses) may be preferred to simply sharing a single unit.

Finally, while Millennials are often considered strictly an urban generation, their reported preferences point to a desire to combine the walkability and compact urban form of the city with the slightly larger units, open space, and privacy of the suburbs. This affinity for smart growth environments indicates yet another source of Missing Middle demand.

How well does this demand relate to current supply? According to an analysis of several housing type preference surveys by Nelson, demand for attached housing types ranges from 34-39% while supply (using Census American Housing Survey estimates) of the same is 30% nationwide. Further, demand for small lot single-family detached homes is also undersupplied with 35-37% of respondents desiring a one-sixth-acre lot or smaller but only 20% of homes falling into this range. Meanwhile, conventional single-family development on larger lots represents 50% of current stock but only 25-31% of survey respondents indicate a demand for these units (Nelson, 2013, p. 44).

This mismatch indicates a need for more contextually appropriate small lot or attached single-family and small multi-family development. Considering many of these insights have come from real estate industry professionals (ULI, NAR, NAHB), it is puzzling why this knowledge has not translated to adjustments in housing products. The following section explores the regulatory and market barriers to Missing Middle housing as identified by advocates, planners, and builders working throughout the country and maps those claims to existing literature on related subjects.

Barriers to the Missing Middle

For a given development to be successful, there are four essential and interrelated components that must align. First, there must be a demand for the development product. Second, and closely related, the price at which the product is demanded must be able to clear the costs of development, including land acquisition, construction, financing, and local fees and entitlement costs. Third, the development must be allowed by local land use regulations, or, failing that, the costs of either overcoming these regulations through appealing for zoning relief or adapting the project to them through redesign must be coverable by the demanded price. Finally, intertwined with local regulation and oversight is the concept of neighborhood opposition. While local governments, not neighboring landowners, make the final call on whether a development can proceed, government officials and the land use regulations they enact are vulnerable to the preferences of their constituents.

In the previous section I explored the evidence for a growing demand for Missing Middle housing types, satisfying step one of the above process. In this section, I discuss the remaining market,

regulatory, and neighborhood barriers to the Missing Middle as they are understood throughout the country. This discussion is meant to serve merely as an overview, with the case studies presented in Chapter 4 providing further detail through an examination of how Missing Middle development is, or is not, being pursued in three suburban Boston towns.

Market Barriers

Market barriers to Missing Middle housing are not often discussed in the existing literature. Barriers that are mentioned tend to arise from either development costs or financing issues. In terms of development costs, Missing Middle typologies are negatively impacted by the costs of constructing units according to building and fire codes aimed at larger multi-family structures. Because small multi-family buildings are often treated like larger structures, they must comply with similar regulations that require fire protection (such as sprinkler systems) or other stringent building codes that increase costs beyond what is financially feasible for developers (Parolek, 2016). In terms of financing, federal loan options tend to encourage single-family home construction and discourage both Missing Middle housing types and the mixed-use environments needed to support them (Opticos Design, 2017). Presumably, these same costs are not a hindrance to developers of larger multi-family units because they are able to spread these costs over the sale or rental of more units.

Regulatory Barriers

Regulatory barriers to Missing Middle housing are the most prevalent obstacles to its development according to activists, who state that

Missing Middle Housing cannot be effectively regulated by conventional, land-use and density-base zoning because these building types often have medium to high densities, excluding them from the single-family use zone, but their small footprints with lower heights don't meet the requirements of multifamily use zones (Missing Middle, 2017)

In essence, zoning codes are seen to overwhelmingly and categorically exclude Missing Middle housing types throughout the city. What's more, where these typologies are permitted, they are often further regulated through off-street parking minimums, dimensional limits, setback requirements, or other non-use regulations in such a way that they are financially unfeasible to develop. Finally, many of the multi-family districts that would permit Missing Middle housing allow even denser development, making larger structures more economically sensible for developers to undertake.

Indeed, zoning and land use regulation have long been known to shape urban environments. Growing from normative beliefs about form and use, the struggle for professional legitimacy, and the desire for replicable standards in an era of rapid colonization and urban expansion, building codes and land use regulations have been constantly operating in the backgrounds of the places we live (Ben-Joseph, 2005). The effects of these regulations, and zoning in particular, have not been isolated to formal considerations. By setting minimum lot sizes and preferring single-family homes to multi-family, local zoning codes have the effect of limiting supply, which is a major cause of housing affordability issues (Downs, 2005). While often sold as a method of improving environmental health conditions and democratizing land property, the kinds of restrictive zoning that favored exclusively single-family development and outlaws the mixed-use neighborhoods of varying density that Missing Middle housing thrives in have also been attacked as racially and socioeconomically exclusionary (Talen, 2012). With much of America's cities and towns blanketed with use-separated, single-family-dominated zoning codes, the development of walkable communities and increased mix of housing types, including Missing Middle units, is incredibly prohibitive.

Neighborhood Barriers

While the deleterious effects of restrictive and exclusionary land use zoning are well understood, changing these laws is not as easy as communicating the problem. First, discussions of reforming zoning to allow more smart growth development is often opposed on grounds of anti-government-interference sentiment, as citizens do not want to have increased density "forced" upon them. This is in spite of the fact that zoning is itself an incredibly restrictive form of regulation and those who wish to allow increased densities are actually arguing from a more "free market" standpoint (Levine, 2006). What's more, as zoning regulations are passed into law by elected officials, these officials must respond to the desires of their constituents. Since these constituents tend to be homeowners concerned with preserving and increasing the value of their most precious assets, their homes, zoning regulations invariably favor policies that either positively impact – or are at least *believed* to positively impact – home values, a conjecture economist Bill Fischel explores in his book, *The Homevoter Hypothesis* (Fischel, 2001). This is further codified by the practice of fiscal zoning, or ensuring that any newly permitted development is able to pay for any new city services it requires through the property taxes for which it is assessed, often resulting in multi-family structures being outlawed for fear of drawing down the public coffers (Fischel, 2015).

In this way, neighborhood barriers to Missing Middle development can be thought of as an extension of regulatory barriers. Additionally, neighbors of potential developers can oppose multi-

family construction on a project-by-project basis. While this approach is more individualized, the reasons for such opposition tend to fall along several common threads: school crowding, traffic, impacts to property values, and social cohesion and crime concerns, despite an abundance of evidence that multifamily units are often less impactful on these fronts than single-family developments (Obrinsky & Stein, 2007).

Addressing Barriers

Again, as Missing Middle housing has not been explicitly discussed in existing planning literature, many of these barriers are based on anecdotal evidence reported by Missing Middle advocates or are barriers to similar development forms (smart growth, general multifamily development, affordable housing) and are mentioned here for their apparent impact on the Missing Middle. With this general description of presently understood potential barriers, and armed with an understanding of Missing Middle housing types, their absence from new construction, and the rising demand for their development, it will now be possible to explore these topics when grounded in a particular place. In the following chapter, I will introduce Greater Boston, its development history, recent and related plans and policies, its demographic and housing market trends, and its current relationship with Missing Middle housing types. In Chapter 4, I dive down further to three suburban Boston towns to take a more detailed look at the regulatory and market barriers to the development of Missing Middle housing.

Chapter 3

Greater Boston's Missing Middle

In order to ground this exploration of Missing Middle housing in a realistic setting, the remaining pages of this thesis delve into the context of Greater Boston (this chapter) and three of its suburbs (Chapter 4). Boston's rich history of developing Missing Middle types, especially the stacked duplex and triple-decker, makes it an ideal location for the resurgence of these typologies. Additionally, the spatial composition of its demographic and employment data, as well as its trends of population growth and housing unaffordability, make suburban housing and densification policies crucial to the success of the region. This chapter describes this history of Missing Middle housing types in the region, illustrates the geographic spread of current units, and potential trends implied by new construction, demographic and market forecasts, and the existing planning and legislative context in the region.

Greater Boston in Brief

Defining Greater Boston

Metropolitan Boston is defined in several different ways depending on the agency and purpose of classification. The broadest definition is the Boston-Worcester-Providence Combined Statistical Area (CSA) as defined by the U.S. Office of Management and Budget. CSAs are the largest category of metropolitan classification and are so named because they combine several Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (μ SAs). Within this sprawling, four-state area, lies the Boston-Cambridge-Newton MSA. This smaller classification, like all other MSAs, is based on a core municipality (Boston) and the surrounding counties that are linked through commuting and economic patterns.

Unique to the Northeast is the New England City and Town Area (NECTA) classification which is defined by the U.S. Census Bureau. While CSAs, MSAs, and μ SAs are defined by county boundaries, the particularly high importance of cities and towns in New England (and the commensurate lower status of counties) makes definitions based on collections of cities and towns more relevant to socio-

political realities. Within the larger Boston-Worcester-Providence Connected New England City and Town Area (CNECTA) lies the Boston-Cambridge-Nashua NECTA.

The Census Bureau also defines urban agglomerations as “Urban Areas” – a collection of census tracts that meet minimum population densities. Urban areas are specifically considered Urbanized Areas if they have a total population of at least 50,000 or Urban Clusters if their population falls between 2,500 and 50,000. Boston’s Urbanized Area spans three states.

The final and most focused definition of Boston’s metro area is the one created by the Massachusetts Legislature and presided over by the Metropolitan Area Planning Council, the area’s regional planning body. This collection of 101 cities and towns make up an interconnected region of residential and commercial hubs and are further grouped into eight sub-regions (Figure 3.2). These communities are also classified into four community types based on their development and demographic composition: Developing Suburbs, Maturing Suburbs, Regional Urban Centers, and the Inner Core (Figure 3.3).

For most of the analysis in this chapter, the MAPC definition will be used. First, this is the most geographically condensed definition of Greater Boston, which allows for a more in-depth look at the data. It also is the only definition that does not leak outside the boundaries of Massachusetts, making comparisons within the metro area a more controlled endeavor. Finally, while MAPC’s planning role is most often advisory, using a boundary that is at least intended to be administrative in nature is helpful for determining any potential policy outcomes.

Boston's Many Metro Areas

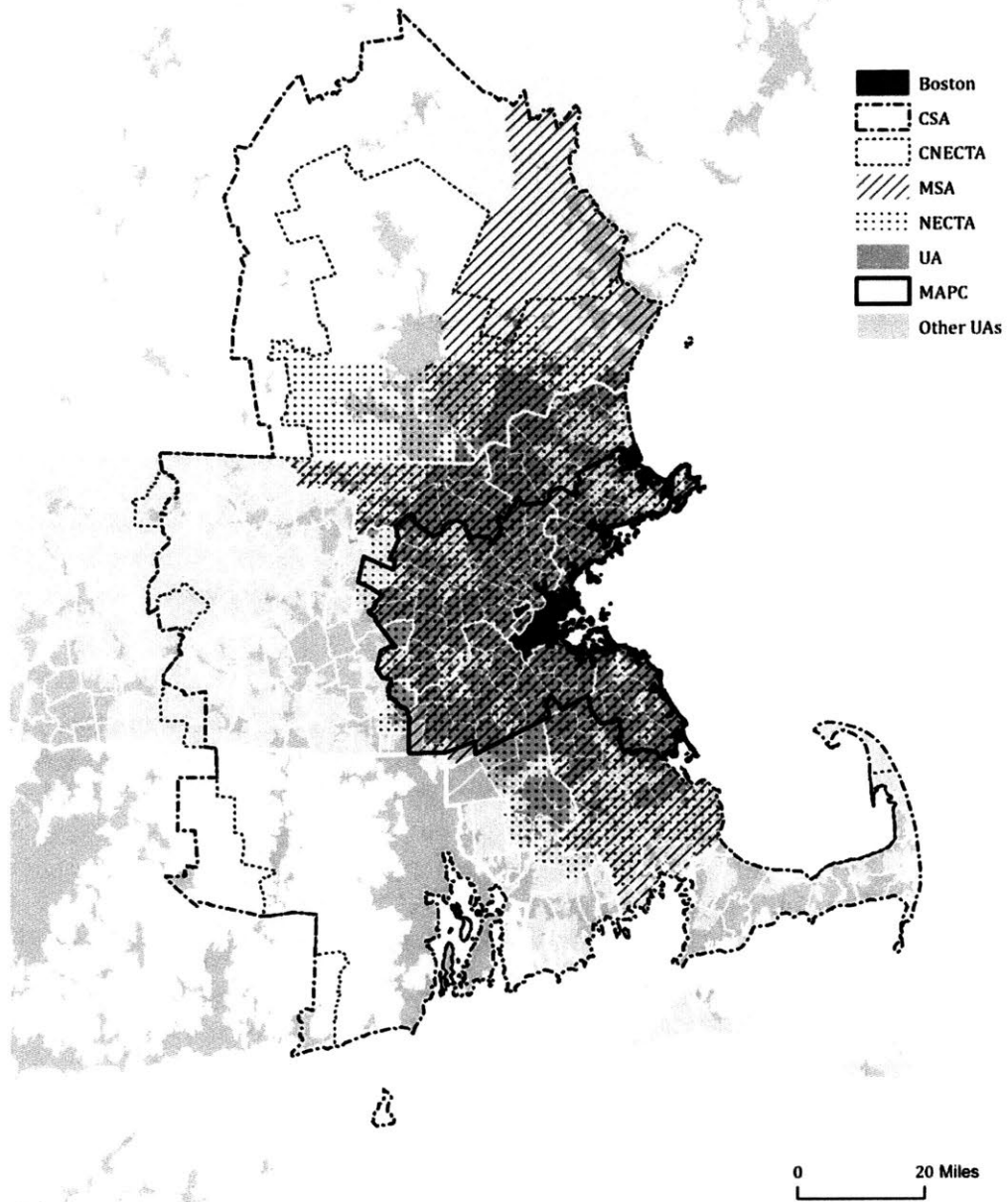


Figure 3.1: Greater Boston's Various Metropolitan Boundaries
(Data from U.S. Census Bureau)

Greater Boston's Development History

Boston's history and geography have combined to shape the development and infrastructure within the region. Boston was founded in 1630 on the Shawmut Peninsula, a site chosen for its central location within Massachusetts Bay, protected by the Harbor Islands and situated at the mouth of the Charles River (Warner, 1999). The city's original economy was a mercantile one. Both as a British colony and as a founding member of the fledgling United States, Boston's waterfront locale and population of skilled sailors made it a center for global trade. In the 19th century, trade would give way to manufacturing and industry, powered by the influx of cheap immigrant labor.

As the city's shipping and manufacturing economy expanded, so did its urban development. Bays and tidal marshes were filled to create more developable land, and the countryside was gradually suburbanized. The growing metropolis soon subsumed the quaint villages and mill towns that had been scattered throughout the hinterland. This growth was spurred and shaped by infrastructural investments. First by the streetcar and commuter rail lines, and later by the local, state, and federal highway system.

The first ring of suburbs, including the likes of Cambridge, Somerville, Arlington, Brookline, is contained within MA Route 128 (later upgraded to Interstate 95). As these are among the older towns in the region and were the most accessible to early forms of transportation, their development has taken a decidedly urban form, with relatively small lots and a greater proportion of multi-family development. The next ring, falling between I-95 and the I-495 bypass, is considerably more prototypically suburban, with large lots and more exclusively single family residential land uses. Still, due to the age of settlement in the area, this area includes bedroom communities, suburbanized colonial villages, and post-industrial manufacturing towns (O'Connell, 2013).

While this urban expansion along rail and highway corridors mirrored that of many other suburbanizing American cities, Greater Boston's colonial history and established village and town centers have created a more heterogeneous urban landscape than exists in other parts of the country. This diversity of urban history has influenced the demographics, economics, and housing trends of the region, and makes Metro Boston a potentially more apt place than most for the expansion of Missing Middle typologies.

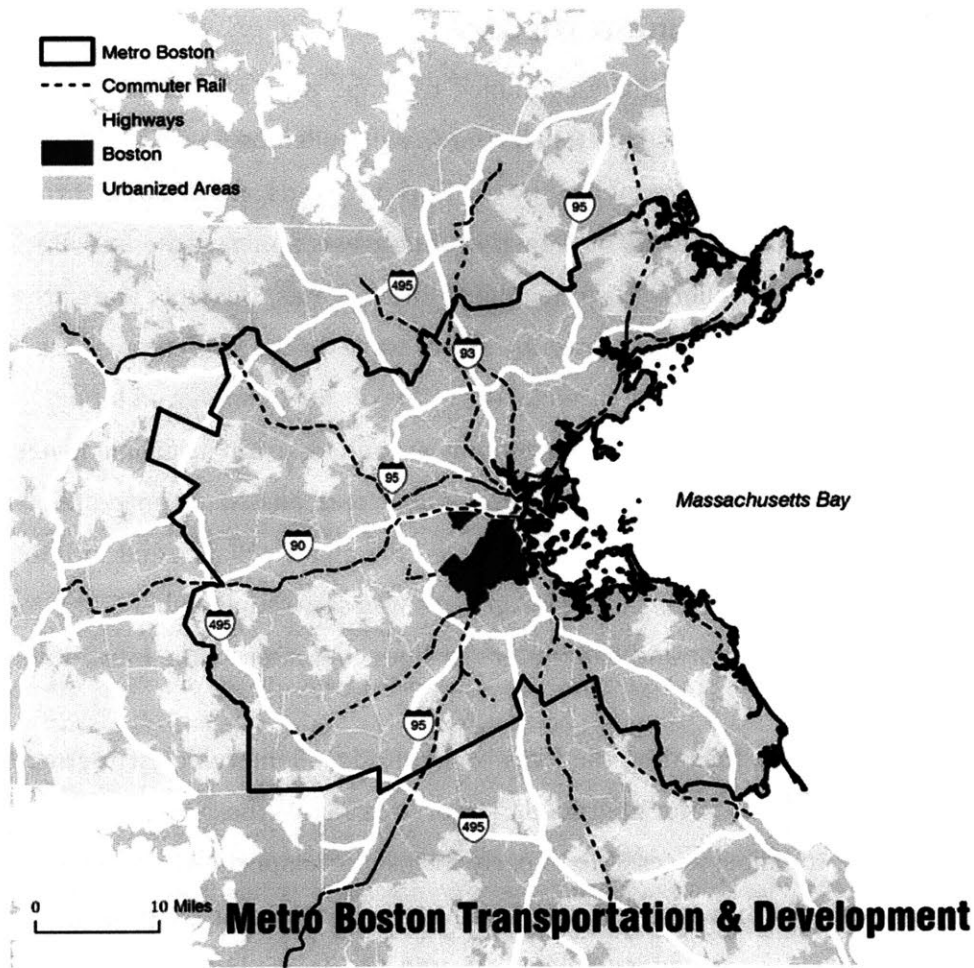


Figure 3.4: Greater Boston's Transportation and Development Geography

Demographics

In order to discuss the region's housing, growth, and land use, it will first be helpful to understand some basic regional demographic information and to explore the geographic variation of that data.

Unfortunately, one issue with MAPC's definition of Metro Boston is the availability and formatting of demographic data. U.S. Census data for cities is aggregated to the statistical area (block, block group, tract), municipality, county, and MSA level. Therefore, collecting demographic data for the MAPC metro area requires aggregating municipality-level data from the 101 cities and towns that comprise MAPC. Due to the methods used to report various data variables, it is often not possible to list an MAPC-wide value for a given municipality-level variable (such as median age). The table in Figure 3.5, which lists demographic data for the entire MAPC metro area as well as for a hypothetical median town within the region, weights some municipality-level values by town population or total households when necessary.

As seen in Figure 3.3, according to 2015 ACS 5-year estimates, the 101 cities and towns of MAPC contain just over 3.2 million inhabitants in 1.25 million households. The region is similar to the U.S. as a whole in terms of racial diversity, with the white population comprising 75% of Metro Boston compared to 76.1% of the nation, though the Boston region is less black (9.1% vs. 12.6%), more Asian (8.4% vs. 5.1%) and less Hispanic/Latino (10.1% vs. 17.1%) than the national average.

By comparing the regionwide figures with those of a hypothetical median town, it is possible to determine the influence of large outliers. For example, while the region's population density is over 2200 persons per square mile, the median town clocks in at under 1500 persons per square mile, indicating the outsized impact of Boston proper and the denser core cities on a region of generally much lower density towns. This outlier influence is also apparent in the percentage of owner-occupied households, with the regionwide rate of 58.3% being dragged down from the median town rate of 76.1% by the renting hotspots of the Inner Core communities.

MAPC Metro Area: Demographic Summary

<u>Population</u>	<u>Regionwide</u>	<u>Median Town</u>
Total Population	3,269,506	20,270
Land Area (sq mi)	1440.5	13.9
Population Density (persons / sq mi)	2269.7	1462.8
Median Age ¹	38.3	42.4
% under 18 ¹	20.3	22.9
% 65 or over ¹	14.0	15.4
% White ¹	75.1	87.6
% Black ¹	9.1	1.8
% Asian ¹	8.4	4.5
% Other ¹	7.3	2.7
% Hispanic/Latino (any race) ¹	10.1	3.4
<u>Households</u>	<u>Regionwide</u>	<u>Median Town</u>
Total Households	1,250,545	7638
Avg. Household Size ²	2.52	2.64
% Family Households ²	61.7	71.2
Avg. Family Size ²	3.16	2.64
<u>Income & Tenure</u>	<u>Regionwide</u>	<u>Median Town</u>
% Owner-Occupied ²	58.3	76.1
Median HH Income ²	\$81,359	\$94,518
Median HH Income: Owner-Occupied ²	\$107,223	\$112,303
Median HH Income: Renter-Occupied ²	\$46,654	\$45,536

Figure 3.5: Metro Boston Demographic Data

- 1: Regionwide statistics have been weighted by municipal population
 2: Regionwide statistics have been weighted by municipal household totals
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

Figures 3.6 – 3.22 map the statistics from Figure 3.5 across the metro area. Predictably, they show Boston and the Inner Core communities representing the bulk of the region’s population. The urban core communities are also markedly younger than their more suburban counterparts; however, this youth is driven not by the presence of children, who are much more prevalent in the western suburbs, but by a large number of college students and young adults. These central communities are also among the most racially and ethnically diverse, though the resident of Asian descent are better represented in more distant suburbs.

The second ring suburbs, which fall between the 128/95 and 495 ring roads, are also marked by larger average household sizes, a greater proportion of family households, and larger family sizes, characteristics which fall in line with the national trend of singles and childless couples moving into urban cores and families decamping cities for the open space and better school systems of the suburbs. Suburban households are also far more likely to own their home than rent. This, in combination with higher incomes for homeowners than for renters across the region, helps to explain the concentration of wealth in the suburbs, especially the second ring suburbs to the west of the urban core such as Wellesley, Weston, and Lincoln.

This suburban concentration of low densities, affluence, and racial homogeneity has immense implications on the kinds of housing that exist in the region, the unit types that are permitted for future development, and the overall urban form of each city and town. Indeed, the demographic identities of Boston’s suburbs play important roles in determining local land use regulations, neighborhood preferences, and developer decision-making.

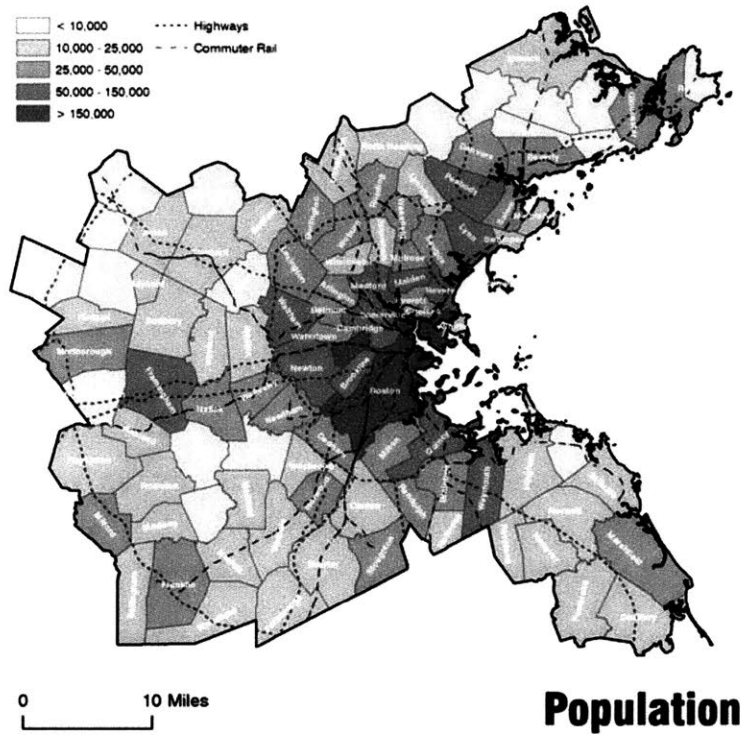


Figure 3.6: Metro Boston Population
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

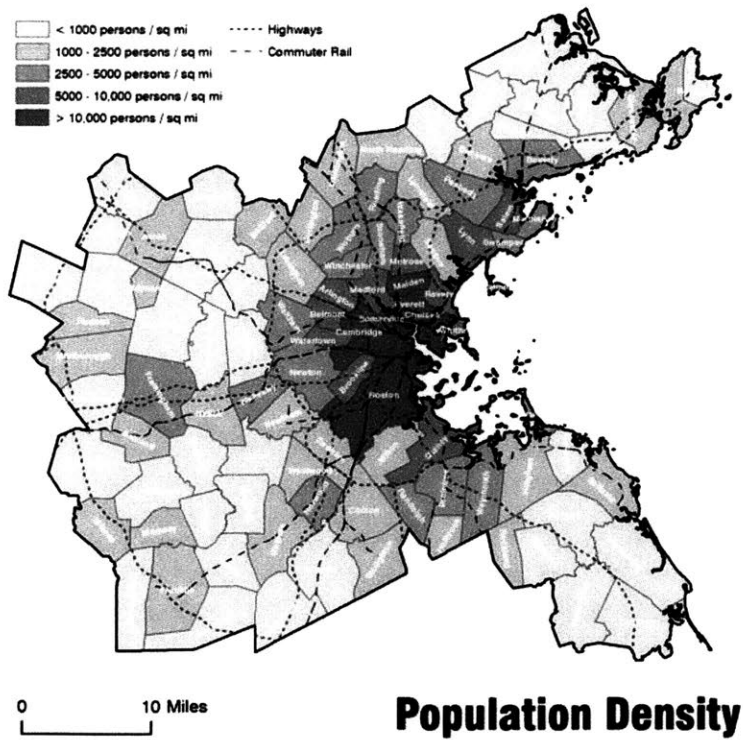


Figure 3.7: Metro Boston Population Density
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

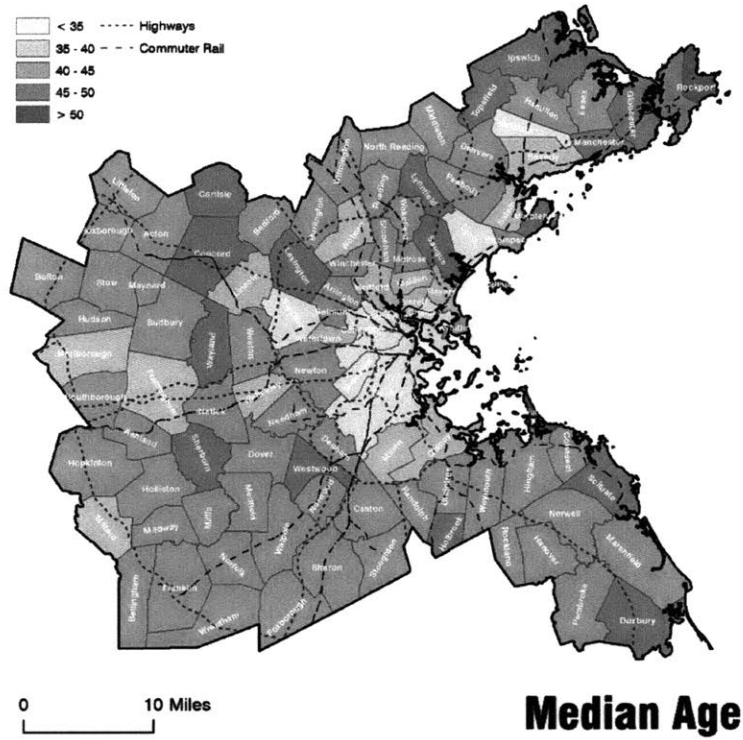


Figure 3.8: Metro Boston Median Age
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

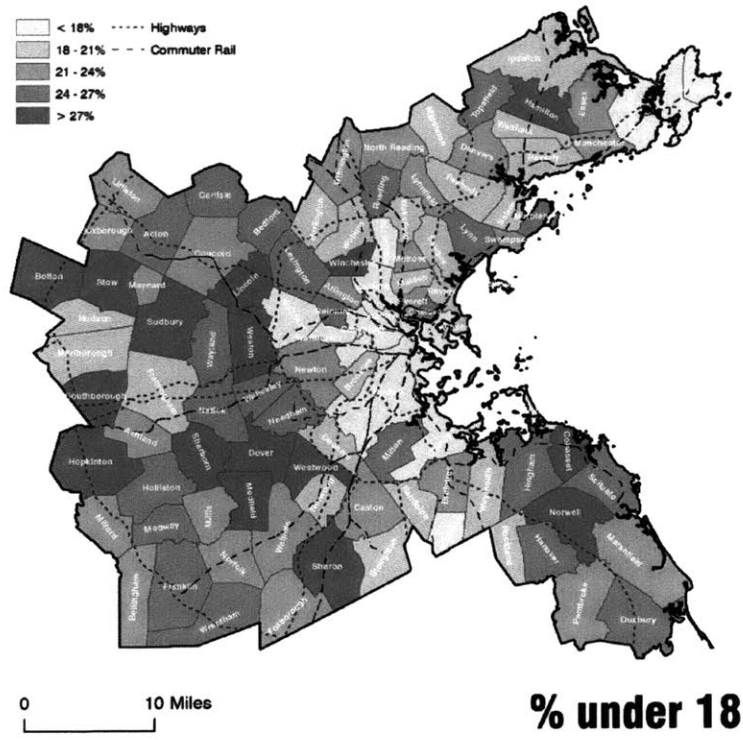


Figure 3.9: Metro Boston % of Population under 18 years old
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

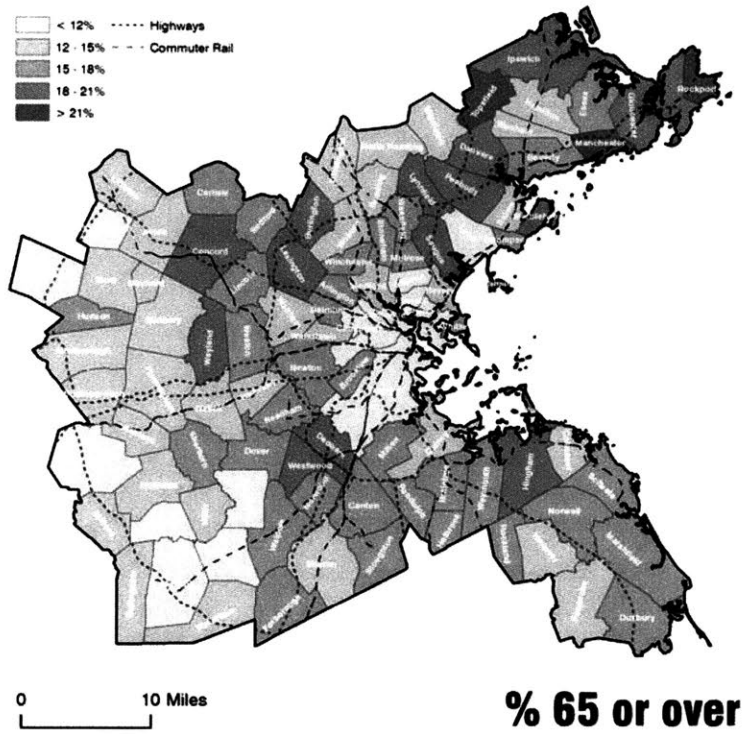


Figure 3.10: Metro Boston % of Population 65 years or older
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

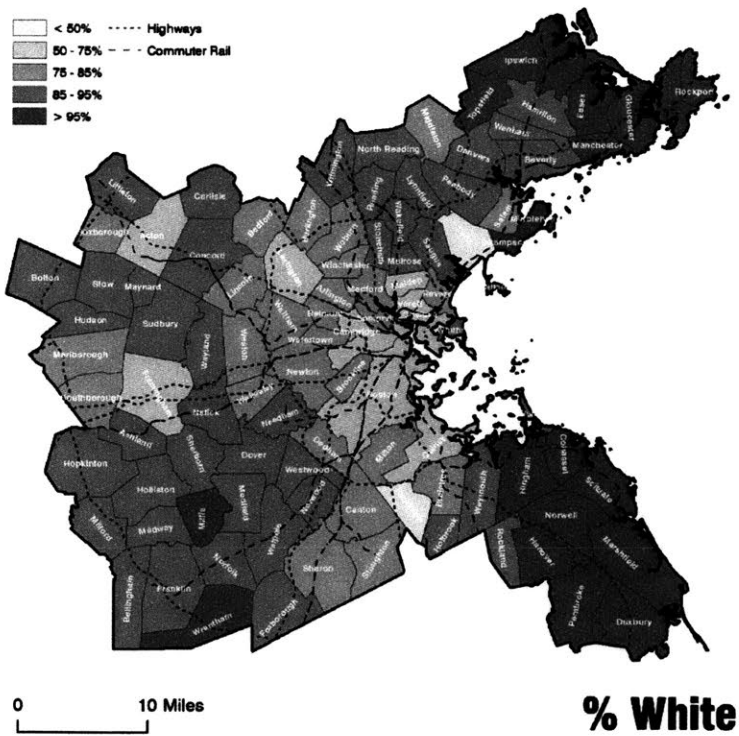


Figure 3.11: Metro Boston % of Population that is white
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

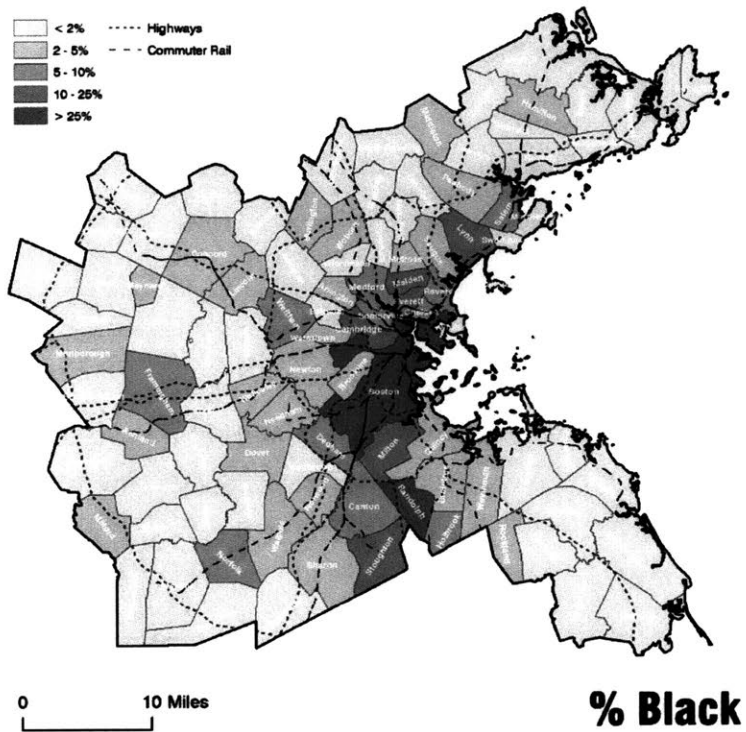


Figure 3.12: Metro Boston % of Population that is black
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

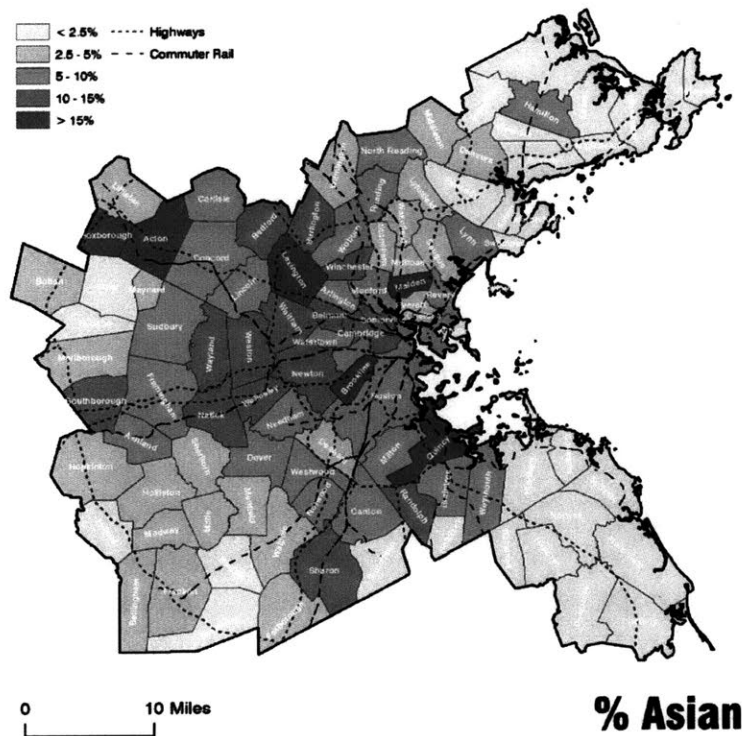


Figure 3.13: Metro Boston % of Population that is Asian
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

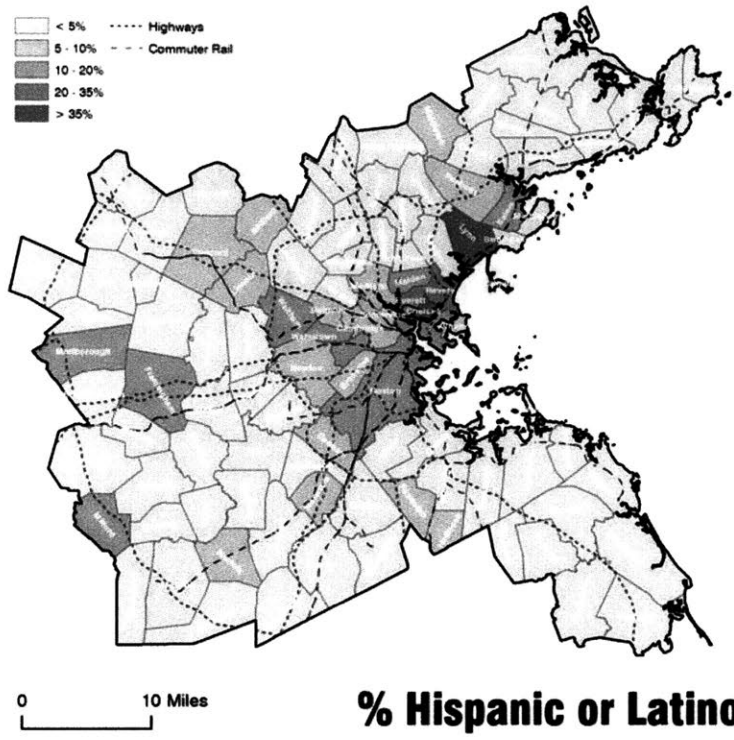


Figure 3.14 Metro Boston % of Population that is Hispanic or Latino (any race)
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

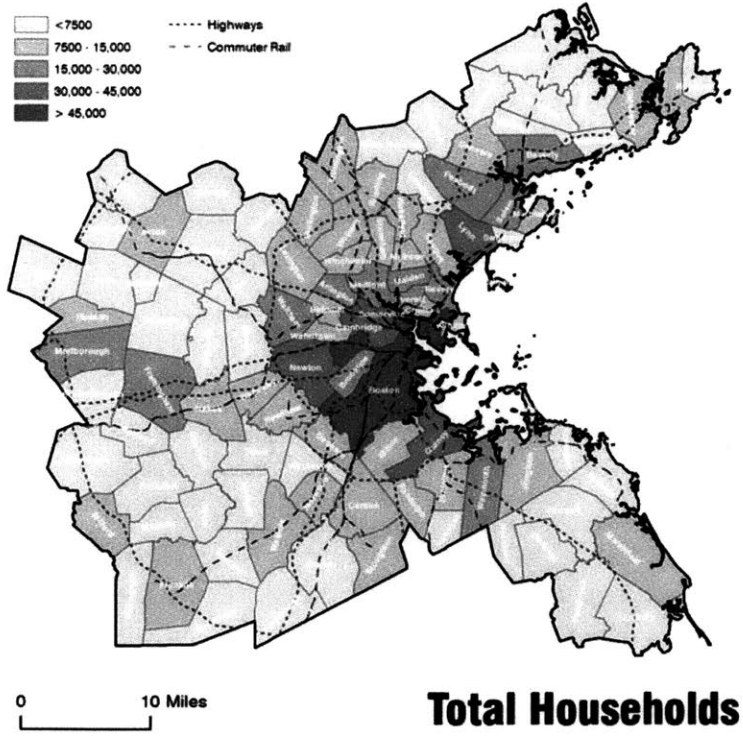


Figure 3.15: Metro Boston Total Households
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

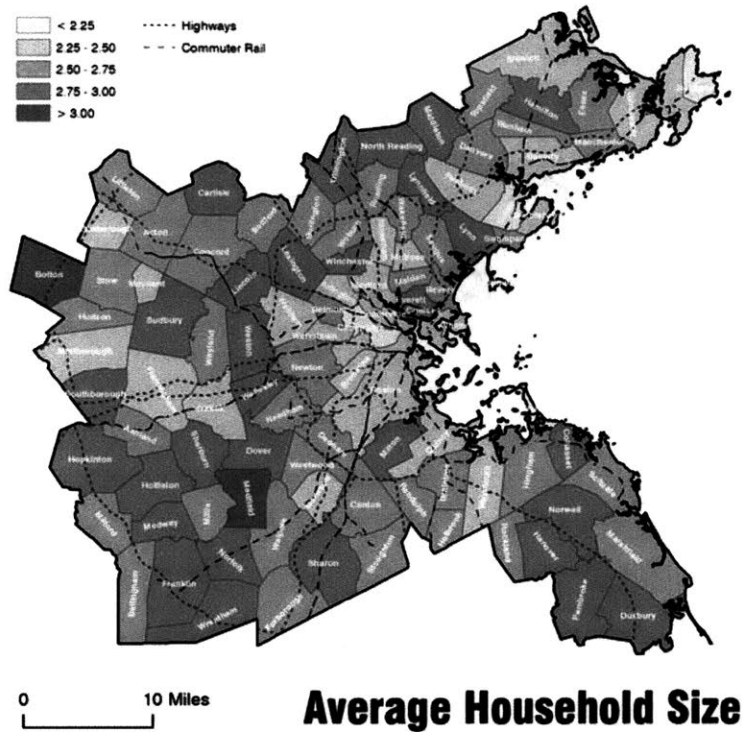


Figure 3.16: Metro Boston Average Household Size
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

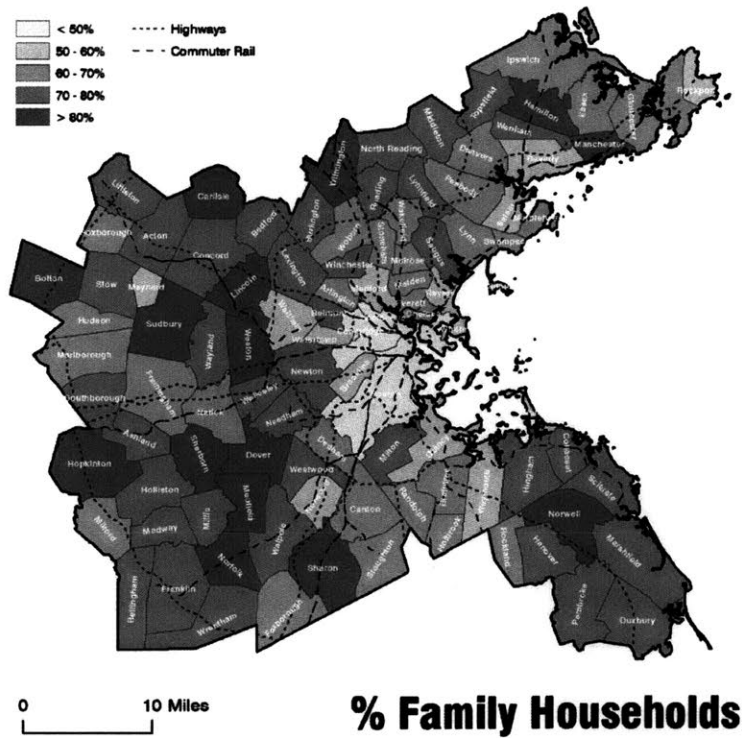
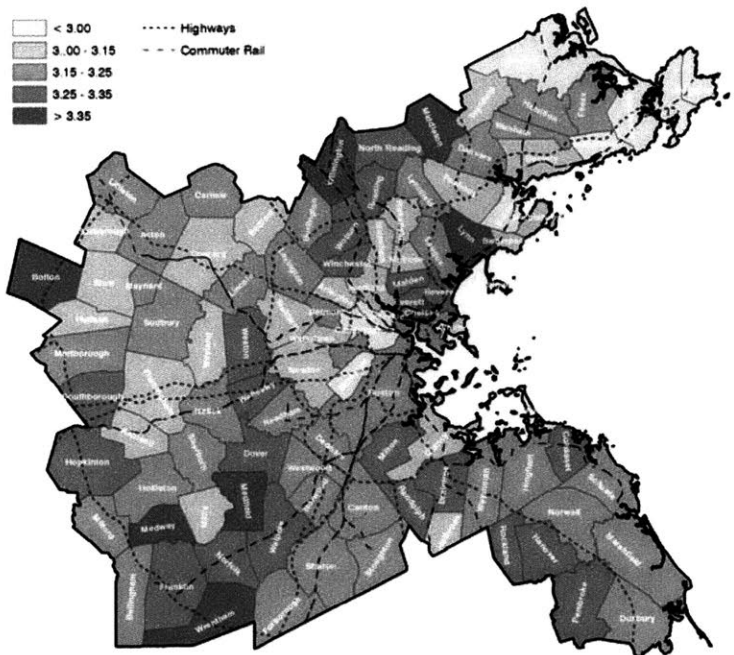


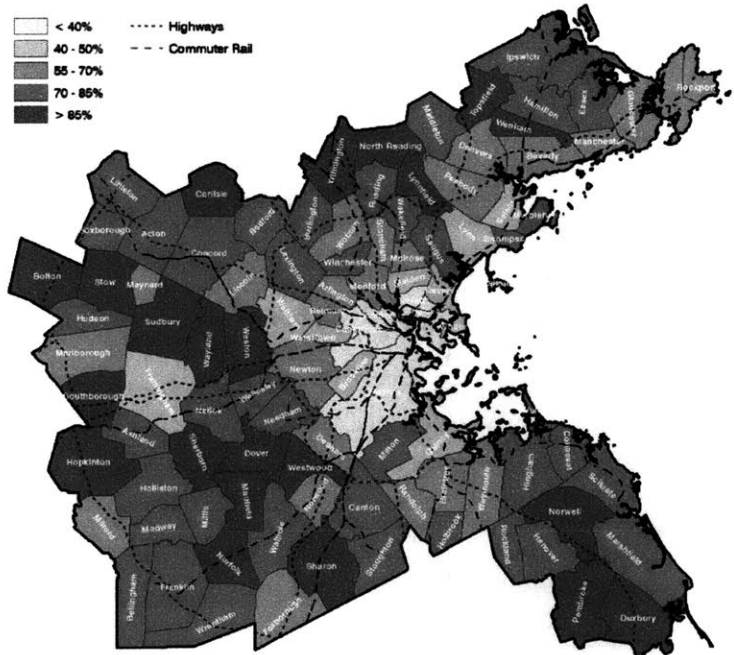
Figure 3.17: Metro Boston % of Households that are Family Households
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)



0 10 Miles

Average Family Size

Figure 3.18: Metro Boston Average Size of Family Households
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)



0 10 Miles

% Owner Households

Figure 3.19: Metro Boston % Households that are Owner-Occupied
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

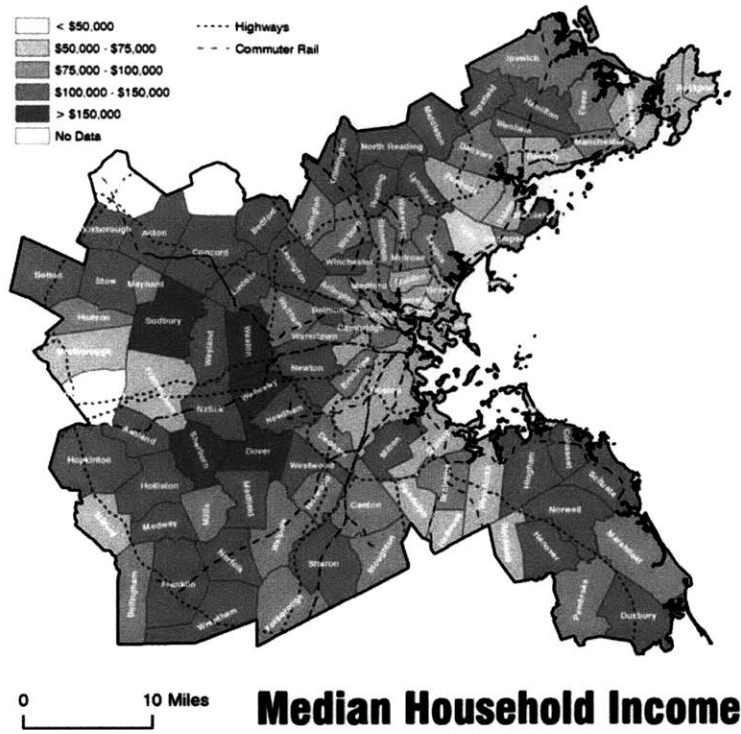


Figure 3.20: Metro Boston Median Household Income over the Past 12 Months
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

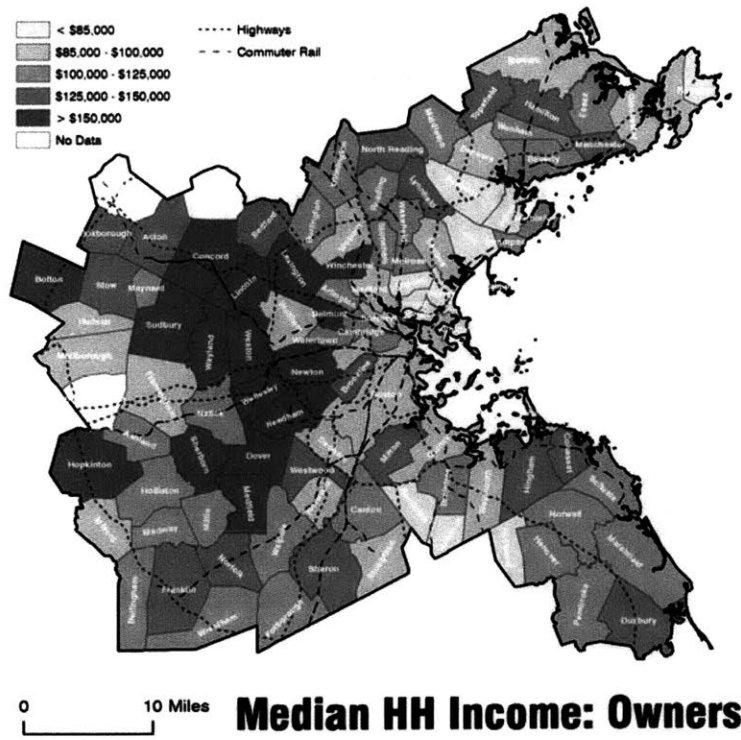


Figure 3.21: Metro Boston Median Household Income: Owner-Occupied Households
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

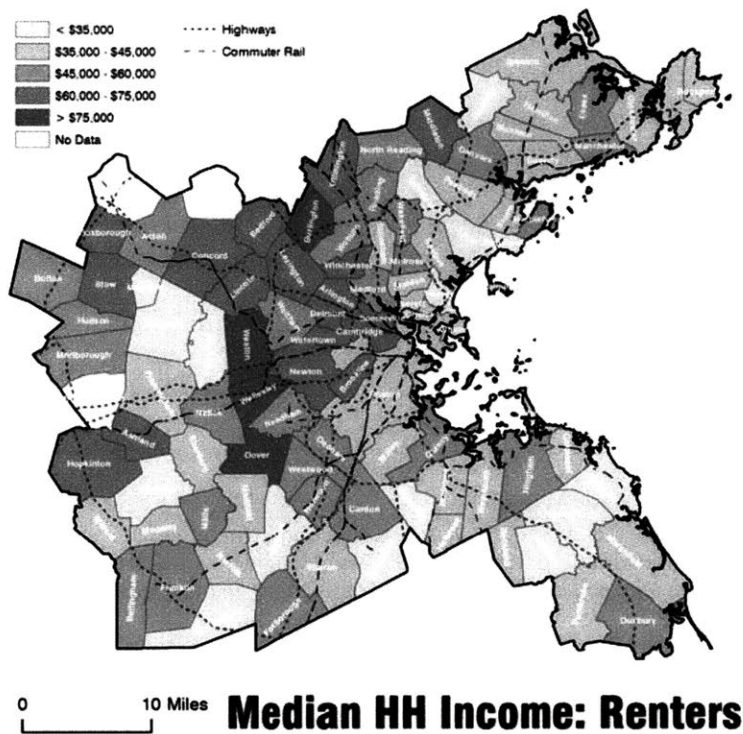


Figure 3.22: Metro Boston Median Household Income: Renter-Occupied Households
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

Employment & Wages

While a full economic analysis is outside the scope of this research, reviewing Greater Boston’s economic geography can provide some additional insight into the urban/suburban divide in the region. Figure 3.23 lists regionwide and hypothetical median town employment and wage data. Metro Boston’s 2015 employment clocked in at just under 2 million workers, resulting in a regionwide employment/population ratio of 0.60. These workers were grouped into over 115,000 firms, resulting in an average firm size of 17.1. A hypothetical median town hosted just over 8000 jobs in just under 700 firms, resulting in an average firm size of 12.6 and an employment/population ratio of 0.42. Again, these regionwide vs. median town discrepancies show the effect of outliers. Namely, while the region as a whole has very substantial employment numbers, these jobs are relatively concentrated. In fact, Boston alone accounts for over 30% of the region’s employment.

MAPC Metro Area: Employment Summary

<u>Employment</u>	<u>Regionwide</u>	<u>Median Town</u>
Total Employment	1,973,538	8396
Total Firms	115,364	689
Average Firm Size (# employees)	17.1	12.6
Employment/Population Ratio	0.60	0.42
<u>Wages</u>	<u>Regionwide</u>	<u>Median Town</u>
Total Wages	\$152 B	\$519 M
Avg, Weekly Wage ¹	\$1170	\$1061

Figure 3.23: Metro Boston Employment Data

1: Regionwide statistics have been weighted by town-level employment
(Data from Massachusetts' Executive Office of Labor and Workforce Development)

The geographic spread of this jobs data is illustrated in Figures 3.24-3.29. These maps again show the impact of Boston's history and infrastructure on its development. Jobs and firms are largely concentrated in the Inner Core communities, but also exist in relatively large numbers around the 128/95 and 495 ring roads and the radial I-90, I-93, and commuter rail corridors. What's more the towns with the largest jobs-to-population ratio are actually clustered around the northwest bend of Route 128/I-95, owing to their sizable office parks and commercial developments. While total wages are predictably highest in Boston due to its sheer employment numbers, average weekly wages are highest in the tech hub of Cambridge and in a few scattered suburbs and exurbs along the ring roads and are generally lower along the South and North Shores.

These employment and wage figures help to illustrate that while Metro Boston displays some signs of monocentricity, with total employment and wages concentrated in Boston and other Inner Core communities, the prevalence of considerable jobs in the highway- and transit-accessible suburbs indicates the potential and need for a decentralized approach to housing the region's workers. That is, while increasing the urban core's housing supply is necessary to meet the goals of improving affordability and shortening commutes, it is not sufficient, and must be partnered with an increase in suburban housing stocks as well.

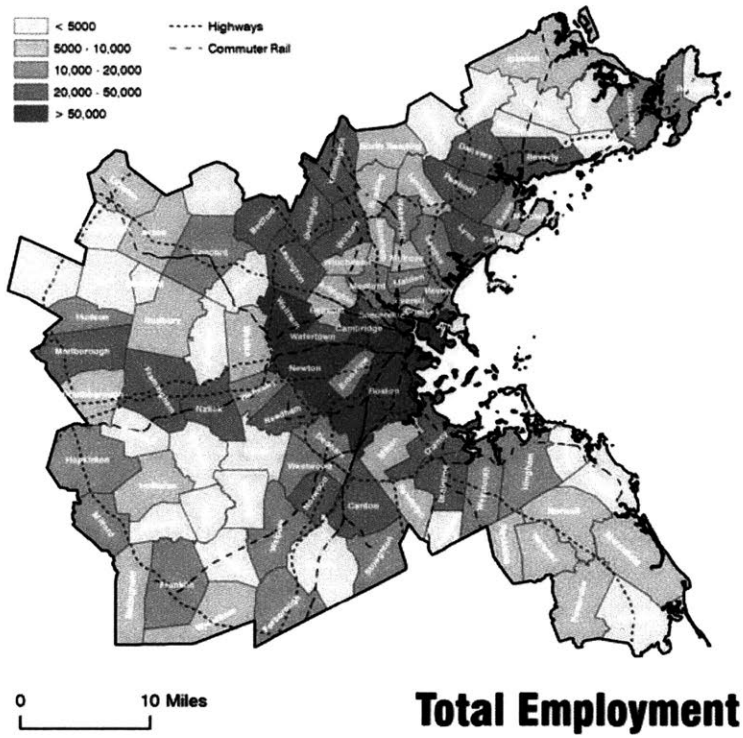


Figure 3.24: Metro Boston Total Employment
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

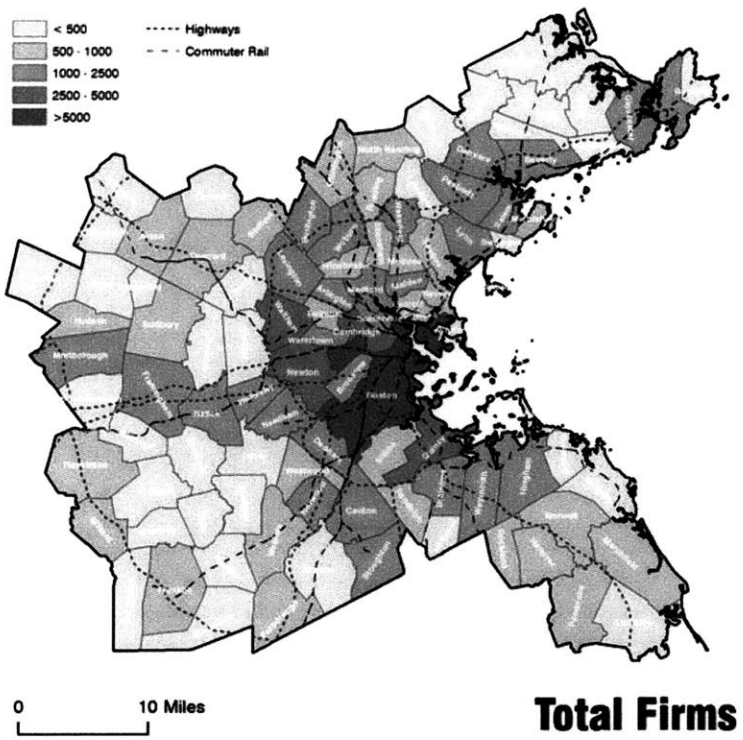


Figure 3.25: Metro Boston Total Firms
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

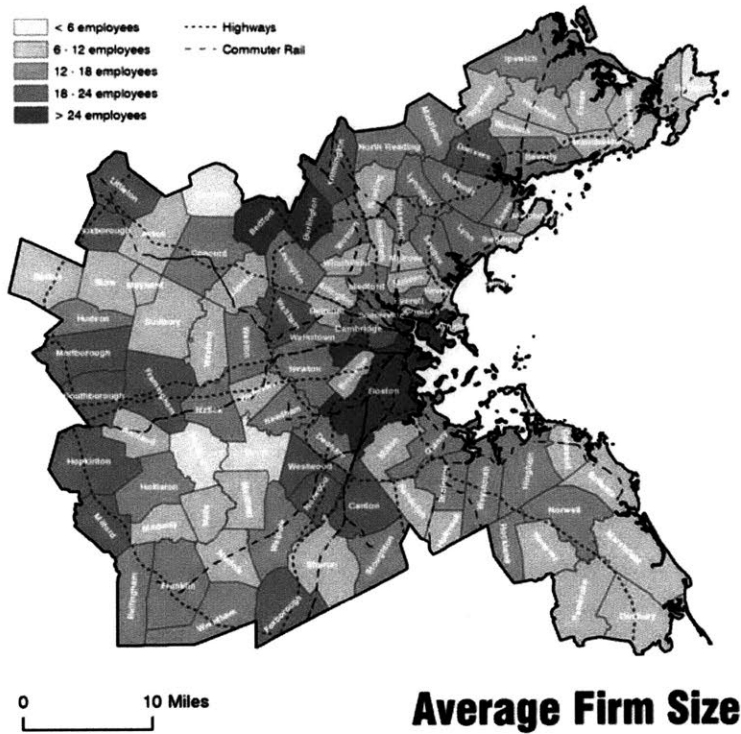


Figure 3.26: Metro Boston Average Firm Size
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

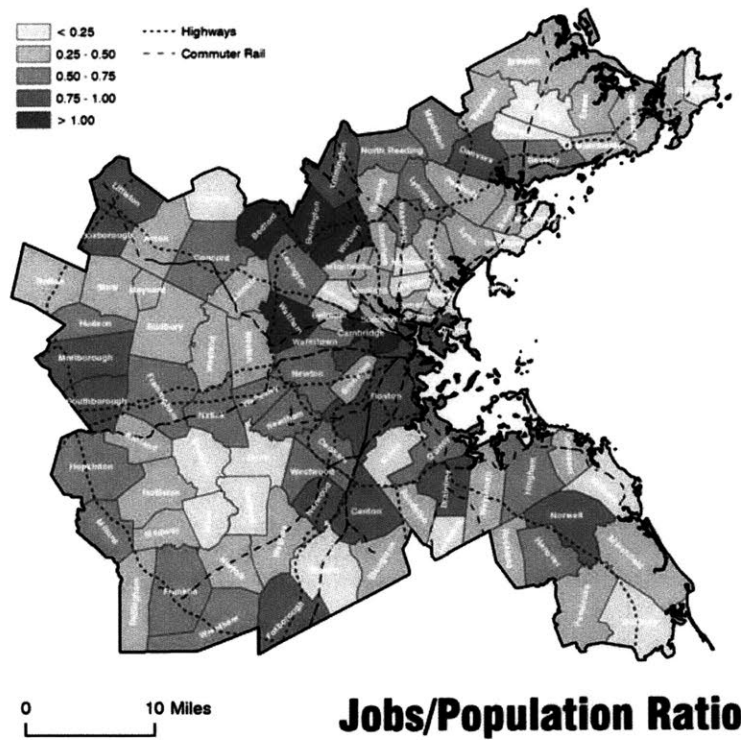


Figure 3.27: Metro Boston Jobs/Population Ratio
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

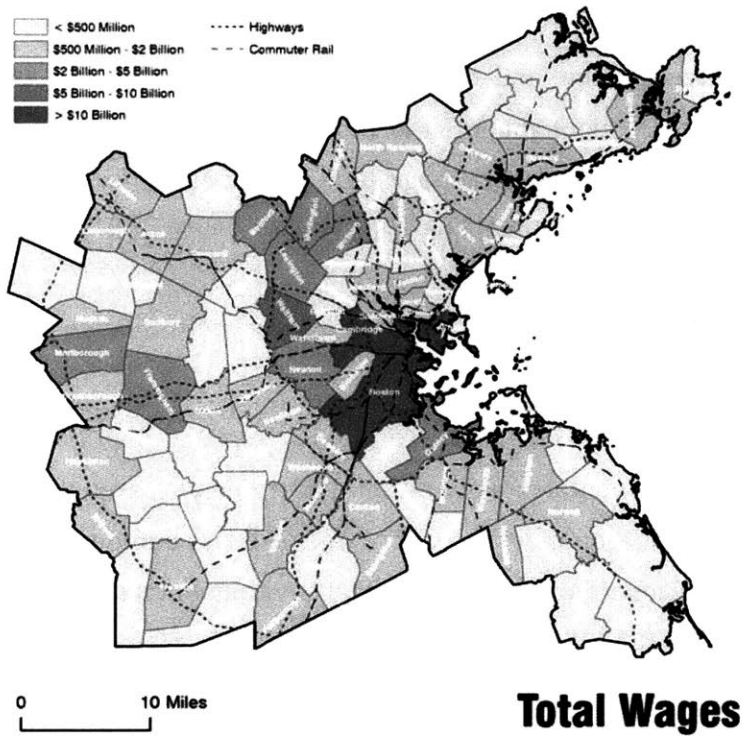


Figure 3.28: Metro Boston Total Wages
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

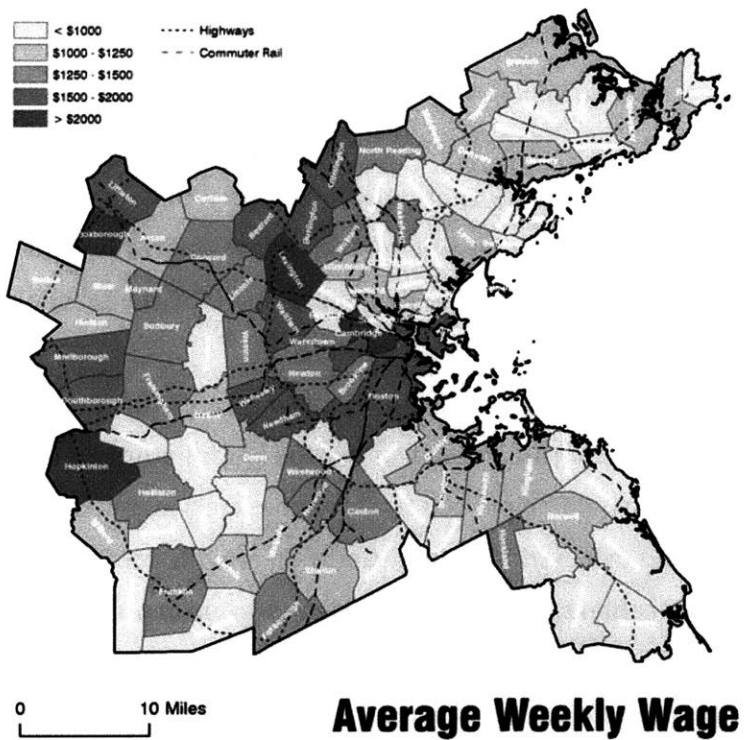


Figure 3.29: Metro Boston Average Weekly Wage
 (Data from Massachusetts' Executive Office of Labor and Workforce Development)

Regional Projections, Plans, and Regulations

In addition to the geographic and demographic contexts of Greater Boston, regional plans, analyses, and regulations also highlight potential implications for the development of Missing Middle units. These reports and policies relate demographic and economic forecasting, revealed consumer preferences, land use practices, and housing affordability concerns to state and local housing and development goals.

MetroFuture

In 2008, MAPC distributed MetroFuture, a 30-year regional plan dedicated to smart growth principles and intergovernmental collaboration (Metropolitan Area Planning Council, 2008). Analyzing demographic and economic projections, the plan lays out ideals for the region's land use, housing, transportation, economic development, and environmental protection. As MAPC is without regulatory power, these goals are intended as guidelines for local and state lawmakers to consider rather than actionable directives. The plan is presented through what is referred to in the document as the "MetroFuture Scenario" – a scenario in which the suggested goals are realized through policy in order to avoid the negative ramifications of the alternative, dubbed the "Status Quo Scenario." The projections and goals most tied to the prospects and limitations of the Missing Middle are explored below.

According to the plan, demographic trends in 2008 predicted an expected 546,000 new residents by 2030, requiring 349,000 new housing units. This increasing overall population would coincide with an increase in the Baby Boomer's share of the citizenry to over 33%. At the same time, the school-age population is predicted to decline by 6%. While the region will become more racially diverse, this non-white population growth will be limited to only the most urban locations without changes to local income-based exclusionary regulations.

Spatially, suburban locations are predicted to grow in areas least equipped for this growth, namely the outer Developing Suburbs. Instead, under the MetroFuture scenario, urban communities with existing infrastructure would be primed to accommodate a larger share of the region's growth through redevelopment and urban infill. When suburban growth does occur, it is encouraged to do so near town and village centers, and will be designed to promote transit use, walkability, and compact development. Indeed, by reigning in rampant suburban and exurban growth, the plan's goals endeavor to "retain their sense of uniqueness and community character" (Metropolitan Area Planning Council, 2008, p. 20).

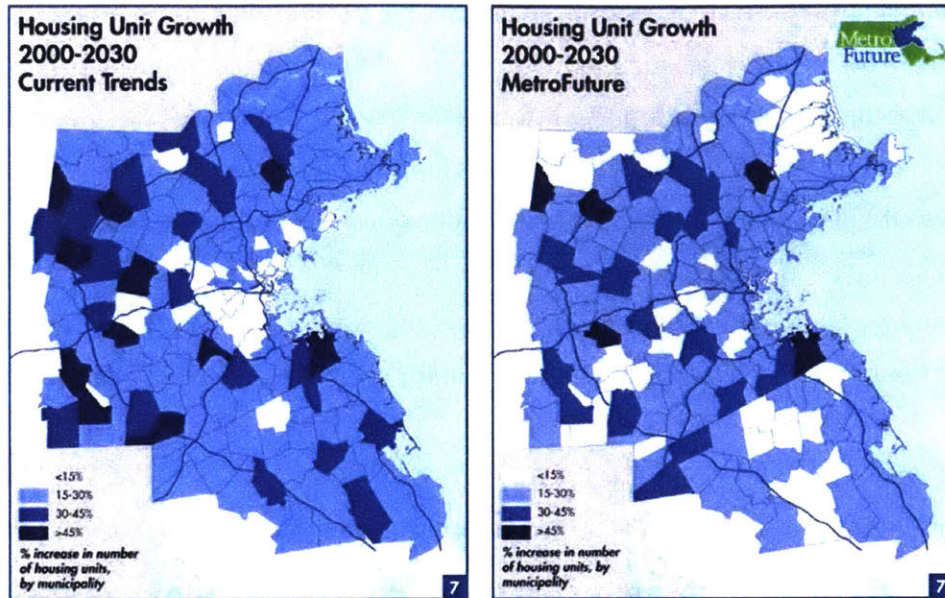


Figure 3.30: Metro Future Preferred Housing Growth Projections
(Image from MetroFuture Regional Plan, MAPC, 2008)

Housing is a specific focus of the plan, with goals aimed at creating more housing choice, reducing lot sizes for new single-family homes, and increasing socioeconomic diversity through housing affordability. Several goals are also targeted at increasing working class units within the suburbs and at improving downsizing options for seniors, particularly salient topics as they relate to some of the goals of Missing Middle advocates as well.

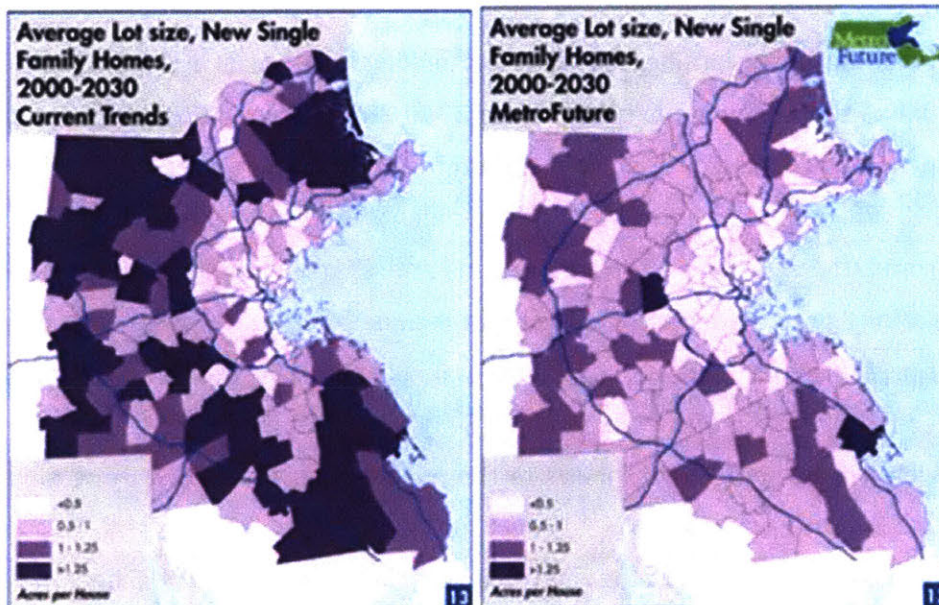


Figure 3.31: Metro Future Preferred Average Lot Size Projections
(Image from MetroFuture Regional Plan, MAPC, 2008)

Finally, MetroFuture's transportation goals involve promoting transit-oriented development through smart growth practices such as town center infill, targeted suburban densification, and improved walkability through multimodal infrastructure.

In all, while MetroFuture does not specifically address the Missing Middle or its characteristic housing types, it does promote the contextual densification of the suburbs through small-lot, affordable-by-design, non-auto-dependent development, achieved via inter-municipality cooperation and regulatory adjustments. These goals align well with the tenets of the Missing Middle, allowing MetroFuture to serve as a jumping-off point for the promulgation of Missing Middle policies.

The Greater Boston Housing Report Card

Each year, The Boston Foundation, the area's largest community foundation, releases the Greater Boston Housing Report Card. The 2016 edition, prepared by economist Barry Bluestone and his team at Northeastern University, analyzes the area's housing and demographic trends to paint a picture of the region's housing health (Bluestone et al., 2016). The report's findings that are salient to the Missing Middle conversation are enumerated here.

First, while the region's economy is growing at a faster pace than either its state or national counterparts, median wages have actually decreased despite an increase in wages for the top 20% of earners. Even so, total jobs in the region have increased by nearly 340,000 since 2009. This ever-increasing demand for housing in the region has the potential to raise home prices, even as the workers demanding this housing are often unable to afford adequate units in close proximity to their work.

In addition to adding sheer numbers of residents looking to take part in the burgeoning economy – with over 340,000 new residents expected from 2010-2030, Greater Boston's population is also shifting in composition. The region's white population comprises a smaller share in 2014 (75.6%) than it did in 1990 (88.1%). The area has also gotten older, with nearly 4% growth in the share of the 65+ age range from 2010-2014 and a 2% contraction in the share of residents younger than 24. Both of these trends, along with a stagnation of median income for renters, are expected to continue, creating further pressure for moderately priced rental housing in the region. Most sobering are the household projections, which indicate a need for 164,000 new units in the region by 2030 – nearly 8,200 per year. This projected growth points to the need for densification throughout the region, especially near job and transit centers.

The most applicable component of the report card is a follow up to the 2015 document regarding sale prices for duplex and triple-deckers in the region. These mainstays of the Missing Middle catalog

have continued to see increasing price appreciation. While this is likely due to the prevalence of these homes in the neighborhoods where even more dense housing is needed – transit-served areas of Boston and university-adjacent neighborhoods of Cambridge and Somerville – it does show a willingness to pay high prices/rents for the kinds of shared facilities promoted by Missing Middle advocates. However, due to this appreciation, “[h]ousing that was once the province of working families is now out of reach for many of them” (Bluestone et al, 2016, p. 48). While this trend has negative implications on the potential for Missing Middle types to inherently increase affordability, it does show that demand for housing in the area allows these unit types to be profitable. Therefore, in suburban contexts where larger multifamily structures may be opposed quite strongly, Missing Middle units can provide increased stock and modest returns while promoting both compact development and the preservation of neighborhood character.

Building for the Middle - ULI

In 2016, the Urban Land Institute’s (ULI) Boston/New England chapter, along with the Terwilliger Center for Housing, released *Building for the Middle: Housing Greater Boston’s Workforce*, a report aimed at assessing regional housing conditions for working households making 80-120% of Area Median Income, or AMI (Urban Land Institute, 2016). These middle income workers have dwindled as a share of the region’s population. While some of this decline can be blamed on changes in employment trends that favor either high-income innovation jobs or low-income service positions – the “hollowing of the middle class” (Urban Land Institute, 2016, p. 13) – the lack of affordable housing in the region is also a major culprit. In fact, the report finds that 36% of these middle-income households are housing cost burdened, meaning they spend 30% or more of their monthly income on housing. Because these households earn too much to qualify for most forms of federal and state assistance, their prospects for affordable places to live are at the mercy of the housing market itself.

The report indicates that due to high costs of housing development in the region, constructing market-rate units for this demographic will be difficult without policies that allow and encourage densification of existing land. The suggested policy solutions include increasing overall housing production, especially in the Inner Core communities in which middle-class workers have dwindled most severely, improving community services in gateway cities that currently boast low- to moderate-income housing markets, and, most germane to the Missing Middle conversation, the streamlining of opportunities for workforce housing in wealthier suburbs.

M.G.L Chapter 40B

Massachusetts General Laws Chapter 40B (or “40B” for short) is often referred to as Massachusetts’ “anti-snob act.” Enacted in 1969, 40B allows developers to sidestep local zoning regulations that prevent density and growth in order to increase the affordable housing stock in the region. In any town that does not meet the minimum threshold of 10% of units reserved for households making up to 80% of AMI, a developer may appeal a denial of a comprehensive permit for their project directly to the state, provided that the project reserves at least 25% of its units for these low-income households (Citizens’ Housing and Planning Association, 2014).

While 40B has been successful in increasing affordable housing development throughout the region, its effect on the development of Missing Middle housing is more nuanced. First, 40B developments tend to be extremely controversial, as developers are able to override nearly all of a town’s zoning laws through appeal to the state in order to build their projects. Though some towns use the threat of this appeals process to work with developers to create contextual 40B developments, others are forced to accept whatever design and unit composition the developer creates. This leads to heated resident objections to density and its effects on traffic, schools, and community character. Therefore, when small multifamily projects are proposed outside of the 40B process, they are sometimes treated the same as their larger counterparts due to raised tensions over density in general.

On the other hand, as opposition to 40B projects often take the form of concerns over the scale of these developments (Mayblum, 2016), it may be possible for Missing Middle proponents to convince neighbors that density through more suburban-style homes is a win-win. However, since many towns only see the need to densify in order to meet affordable housing requirements, Missing Middle types can only be promoted under these circumstances if they can also provide affordable units. While it is financially more difficult to offer 25% of units as affordable in small developments as the costs of doing so are not able to be spread across as many market-rate sales, it can be done in wealthy suburbs where even smaller, shared units demand a hefty premium (Keen, 2008).

M.G.L Chapter 40R

Massachusetts General Laws Chapter 40R (40R) was enacted in 2004 to promote smart growth development throughout Massachusetts by encouraging local density overlays through cash payments from the state to municipalities (Verilli & Raitt, 2009). Towns that create a 40R overlay district in areas with transit access, concentrated development, or other “highly suitable” characteristics are eligible to receive \$10,000-\$600,000 provided that the overlay allows as-of-right

densities of 8-20 units/acre (depending on the housing type), restricts the purchase/rent of 20% of the newly allowed units to households making 80% of AMI or less, and is certified to not detrimentally impact local infrastructure. The town receives an additional \$3,000/unit for each building permit issued under the auspices of the overlay. In addition, the companion legislation of Chapter 40S provides “school cost insurance” to towns adopting 40R overlays in order to safeguard against negative impacts to local school systems due to increased density.

40R was conceived as a way of increasing housing affordability in the region, as well as reducing urban sprawl by creating more as-of-right densities in transportation- and infrastructure-oriented districts. 40R has proven relatively popular in Boston’s suburbs, especially when compared to Chapter 40B. Because 40R allows communities to enact design review restrictions to overlay regulations, permits infrastructure-loading reviews, assists towns with school funding if necessary, and provides cash payments, it is seen as the “carrot” to 40B’s controversial “stick” approach.

While most 40R districts to date have generally been large-project driven, the minimum density requirements of the law could include Missing Middle typologies. Indeed, in some larger projects – including one that will be covered in more detail in the following chapter – townhome-style development has been spurred with this law. What’s more, the requirement to create such districts in transit- or service-rich areas further aligns with the goals of the Missing Middle.

M.G.L. Chapter 40A and Town Governance

Chapter 40A of the Massachusetts General Laws, also known as the State Zoning Act, was enacted in 1975 as a revision of the prior Zoning Enabling Act. When the state adopted the Home Rule Amendment to its state constitution in 1966, it redefined its municipalities from administrative subdivisions of the state to autonomous entities, obviating the need for an “enabling” act for zoning. Instead, land use regulation had become the absolute right of the cities and towns, rather than the purview of the state simply carried out by the municipalities. In practice, however, the state imposes several limitations on a community’s land use power.

First, it is important to understand the distinction between a city and a town in Massachusetts. When a municipality establishes its charter, it determines whether it will become a city or a town. Under state law, this means the municipality is deciding between a form of government that relies on an elected city council and either a strong or weak mayor (city) or a traditional town meeting, in which all members of the community (or a representative group) gather to vote on changes to local legislation (town). In the MAPC Boston Metro Area, 19 communities are cities, 76 are towns, and six are towns with a city form of government.

One can see how while a town style of government ensures a purely democratic form of lawmaking, in a modern setting where town populations number into the tens of thousands, convincing the majority of town residents on a given issue, rather than simply a majority of elected officials, can prove very difficult. This is even more troubling in the realm of zoning, where a change to a zoning by-law in a town setting requires an approval by two-thirds of those at a town meeting according to state law (Barron et al, 2004). Should the proposed measure fail, it is forbidden from being heard by the town meeting again for two years. What's more, as these meetings only happen twice per year, attempting to alter zoning in this context is incredibly prohibitive.

The History and Present of Boston's Missing Middle

The Streetcar Suburbs and the Seeds of the Missing Middle

In *Streetcar Suburbs*, planner and historian Sam Bass Warner, Jr. traces the impact of late 19th century transportation infrastructure, namely the horse-drawn and electric streetcar, on the growth and development of Boston's immediate suburbs (Warner, 1962). Over a period of 30 years, Boston grew from a compact, walking city to a more sprawling metropolis due to the spread of fast and convenient transportation via streetcars. These privately built and operated lines were partnered with public investment in street, water, sewer, and power infrastructure to hasten the expansion of developable land for the city's growing workforce. This growth moved beyond Boston proper and into the then country suburbs of Roxbury, West Roxbury, and Dorchester as well as to other more established neighboring cities like Cambridge and Somerville.

While these developments at first took forms similar to those in Boston – multi-family homes cheek-by-jowl with industry and commerce – albeit with slightly cheaper building materials (wood instead of masonry) – these suburbs eventually became more solely residential. Though some of these homes belonged to Boston's wealthy class, many residents of the new suburbs were upper middle-class commuters whose long, but regular work hours made affordable suburban land along streetcar routes very attractive. More still were lower middle-class workers who could not afford the single-family homes of the upper classes and built duplexes and three-deckers in areas best served by cross-town transit, a necessary amenity for workers whose places of employment changed over time.



Figure 3.30: Greater Boston's Historic Missing Middle (Warner, 1962)

As the population grew, streetcar lines expanded further and further into the countryside, allowing middle-class commuters to follow with their single- and two-family homes. As cross-town service improved, these areas became populated by lower middle-class workers and their denser housing forms as well. This sporadic expansion created inherent class segregation in the suburbs, not through exclusionary regulations, but merely by the nature of land economics and transportation needs. In fact, though no zoning was in place, districts took on a very homogenous feel in terms of building types simply based on social norms and the desire to be surrounded by members of the same economic class. This was further ingrained by both custom and speculative builders who specialized in certain construction types and responded to the inertia of architectural tastes in the region.

What's more, the scarcity of land during the first years of the streetcar's expansion meant that multifamily units often rented for as much as older single family units. It wasn't until the transportation network had expanded further that subsequent generations valued and expected larger lots and units and were willing and able to move further afield to find them.

Through these processes, Boston's immediate suburbs were filled with both single-family and small multi-family homes. Whereas central city units had been built of brick or stone and were attached as townhouses, suburban structures tended to be wood-framed and detached, with vertical stacking of units where necessary, though even the multi-family units did their best to camouflage themselves as large single-family. This heritage of housing mix and small multi-family structures make the Boston region a particularly reasonable place to expect to see Missing Middle housing types being constructed. However, despite this architectural history, the data reveals a very different picture.

Greater Boston's Missing Middle: What the Data Show

In this section, I review available Census data to demonstrate the extent of Missing Middle housing types in the Boston region. I begin by charting and mapping existing Missing Middle typologies in the region. I then explore their physical attributes and the sociodemographic characteristics of their inhabitants. Finally, I illustrate where the Missing Middle has been permitted in the region in recent years and investigate how these permits intersect with local demographic characteristics.

The Existing Housing Stock

While successful Missing Middle projects require walkable contexts and contextual design, in order to assess the existence of Missing Middle typologies in the Boston region, a rough proxy based on the number of units in a given structure will be used to approximate the Missing Middle. As was the case with the national data in Chapter 2, existing units in single-family attached or 2-9 unit multifamily structures will be designated as Missing Middle housing.

Using this definition, we see that Metro Boston's housing stock is considerably more middle-density oriented than the nation as a whole. While the national share of single family detached housing sits at around 62% and Missing Middle typologies at just under 19%, only 43% of units in the Boston region are single family detached and over 36% fall into the Missing Middle range according to 2015 ACS 5-year estimates (figure 3.31).

Existing Housing by Structure Type

<u>Structure Type</u>	<u>MAPC Metro</u>	<u>National</u>
1 Unit Detached	42.8%	61.6%
1 Unit Attached	5.8%	5.8%
2 Unit	12.0%	3.7%
3-4 Unit	12.2%	4.4%
5- 9 Unit	6.4%	4.8%
10-19 Unit	5.2%	4.5%
20+ Unit	15.2%	8.7%

Figure 3.31: Existing Housing by Structure Type
(Data from U.S. Census Bureau, American Community Survey 2015 5-year Estimates)

Mapping the Missing Middle

Diving deeper into the numbers, we can see that these Missing Middle units are of course not equally distributed throughout the region. First, let us look at the distribution of all housing units in the region. As would be expected, the city of Boston contains the single largest number of total units, representing over 20% of all the region’s housing. In fact, over 50% of Metro Boston’s units are located in just 15 cities and towns, concentrated in the Inner Core and along major highways and transit lines (Figure 3.32).

When we separate units by structure size/type, we can see that in all but the most centralized Inner Core communities, single-family detached housing is the dominant housing type (Figure 3.33). Indeed, there are only 20 municipalities in the region in which single-family detached housing comprises less than 50% of units and only 7 communities in which the share falls below 25%.

Conversely, large multifamily units (i.e. units in structures with 10+ units) are rather heavily concentrated in precisely the communities in which single-family homes are rare (Figure 3.34), representing 25% or more of all housing units in only nine municipalities. What’s more, in 47 communities – nearly half of the region – large multifamily units account for less than 10% of all units. Interestingly, there are some largely single-family suburbs that also have among the highest shares of large multifamily housing. While identifying the causes of this phenomenon are outside the scope of this research, it is likely that the outsized prevalence of large multifamily structures in towns like Boxborough, Stoneham, and Weymouth are due to 40B developments.

Though Missing Middle units are, like large multifamily units, generally more prevalent in Inner Core communities (Figure 3.35), they are much more evenly distributed throughout the region. While Missing Middle types represent over 50% of all units in only six communities, the Missing Middle share is over 20% in 52 communities, indicating the higher prevalence of these types in the region.

When we look at a more specific breakdown, of Missing Middle types, however, we do start to see more geographic concentration. Figures 3.36 – 3.39 illustrate the spatial distribution of the share of each community’s units that exist in single-family attached, 2 unit, 3-4 unit, and 5-9 unit structures. For the most part, these results are to be expected. 5-9 unit representation is highest in the Inner Core, likely owing to this area’s history of densification. 3-4 unit structures are most prevalent in Boston, Somerville, Everett, and Chelsea where the traditional Boston three-decker is very well-known. 2-unit structures, usually stacked duplexes, are most common in the first ring suburbs like Watertown, Arlington, and Medford. Single-family attached units, however, surprisingly make up a larger share of units in scattered suburban communities Like Milford, Stow, and Lincoln. While the cause of this surprising fact is beyond the scope of this thesis, it is likely due to the overall small numbers of units in these town, causing any single townhouse development to make a large impact.

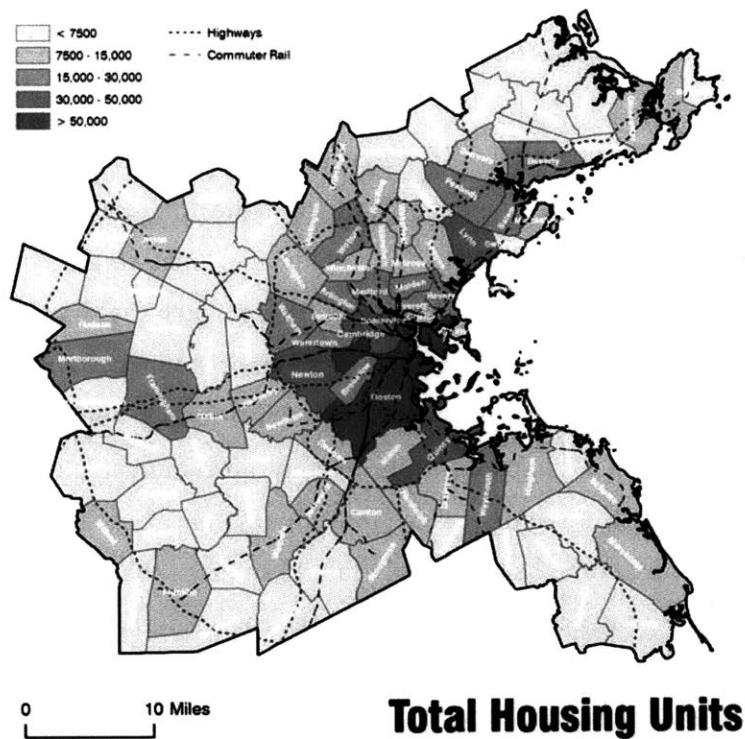


Figure 3.32: Metro Boston Total Existing Housing Units
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

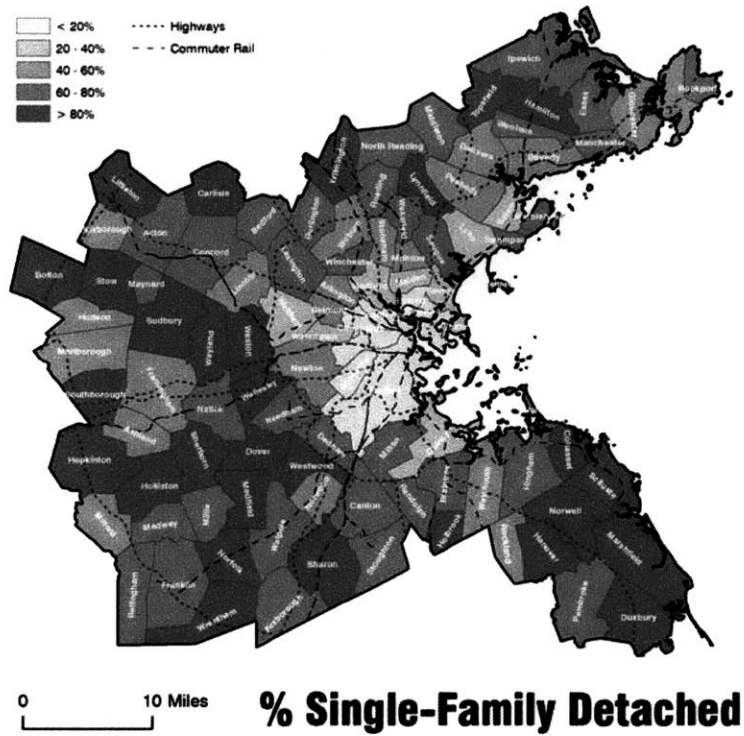


Figure 3.33: Metro Boston Share of Single-Family Detached Units
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

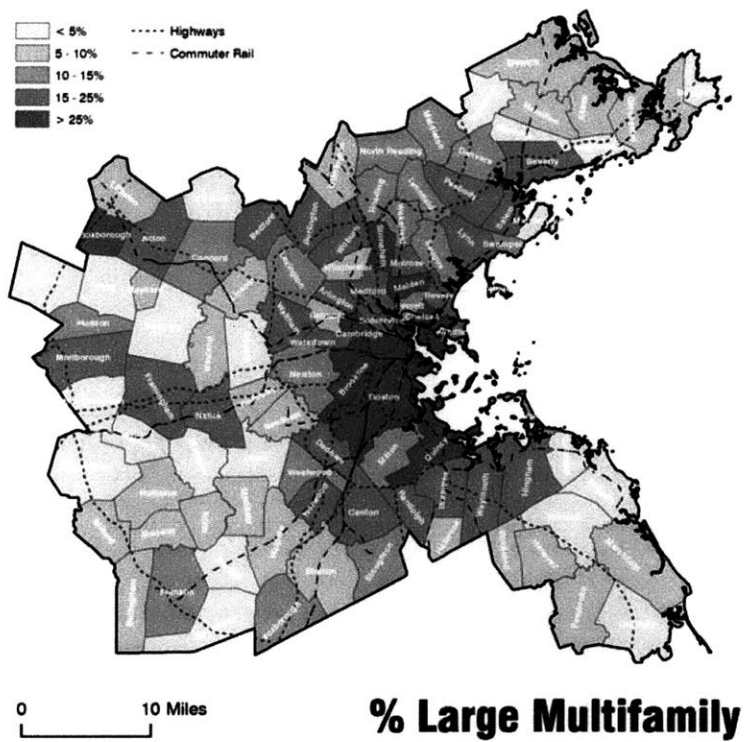


Figure 3.34: Metro Boston Share of Large Multifamily Units
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

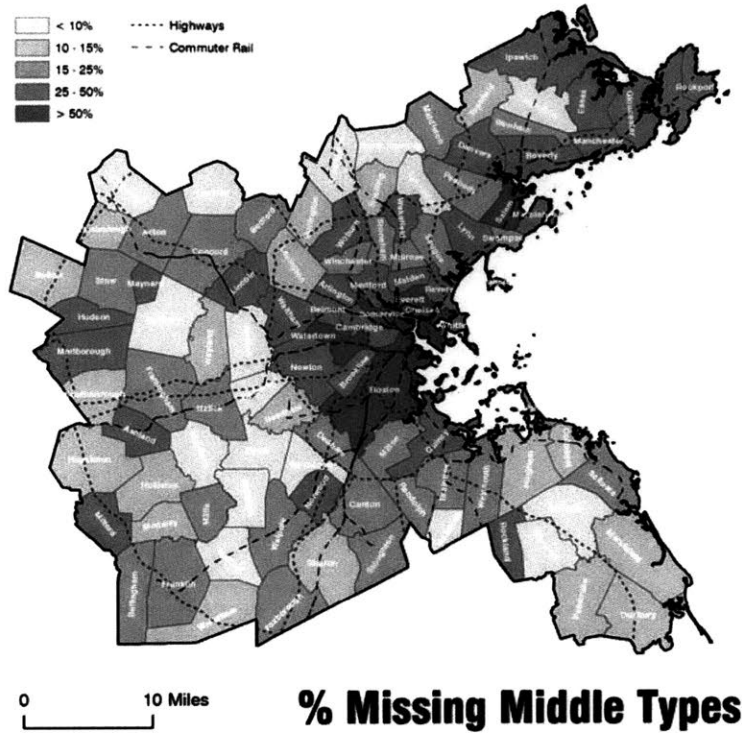


Figure 3.35: Metro Boston Share of Missing Middle Units
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

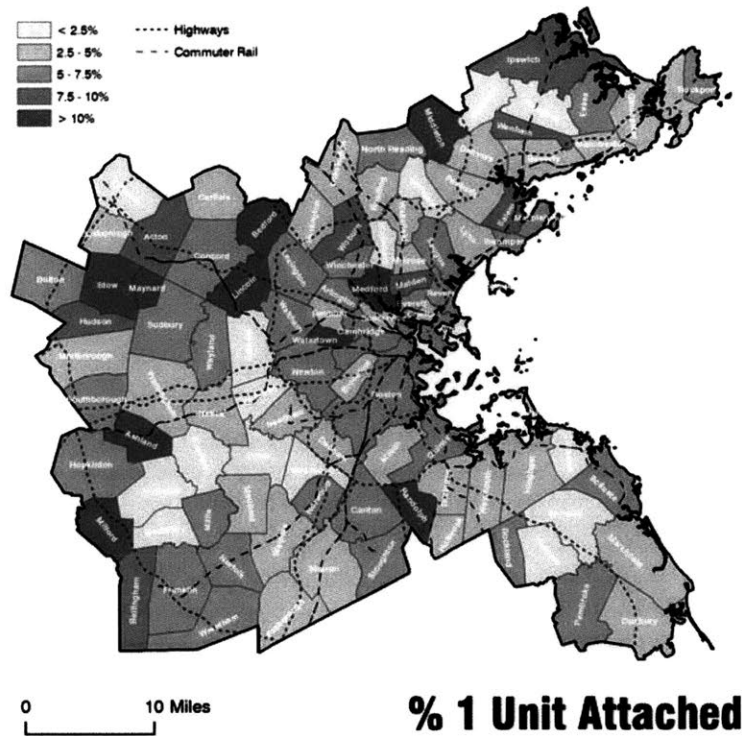


Figure 3.36: Metro Boston Share of Single-Family Attached Units
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

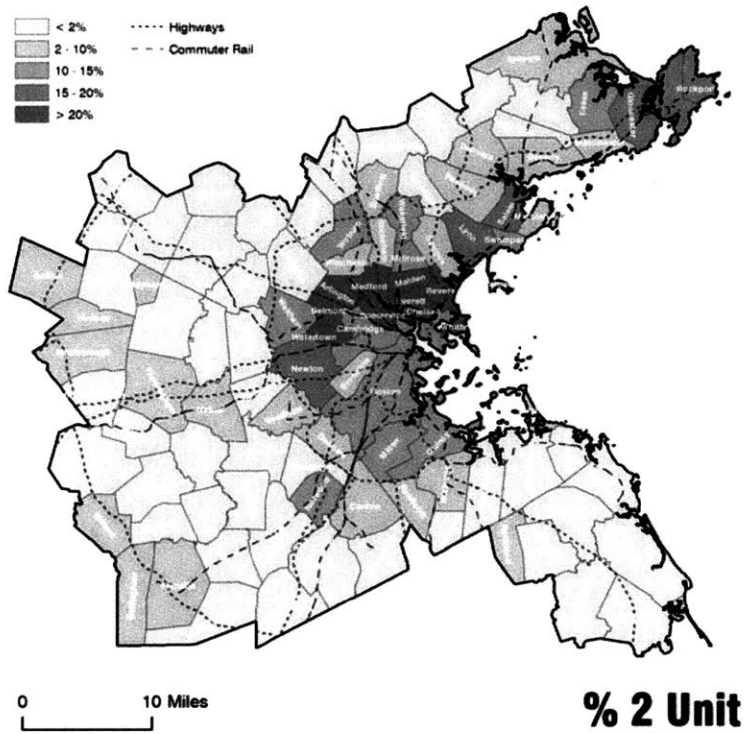


Figure 3.37: Metro Boston Share of Units in 2 Unit Structures
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

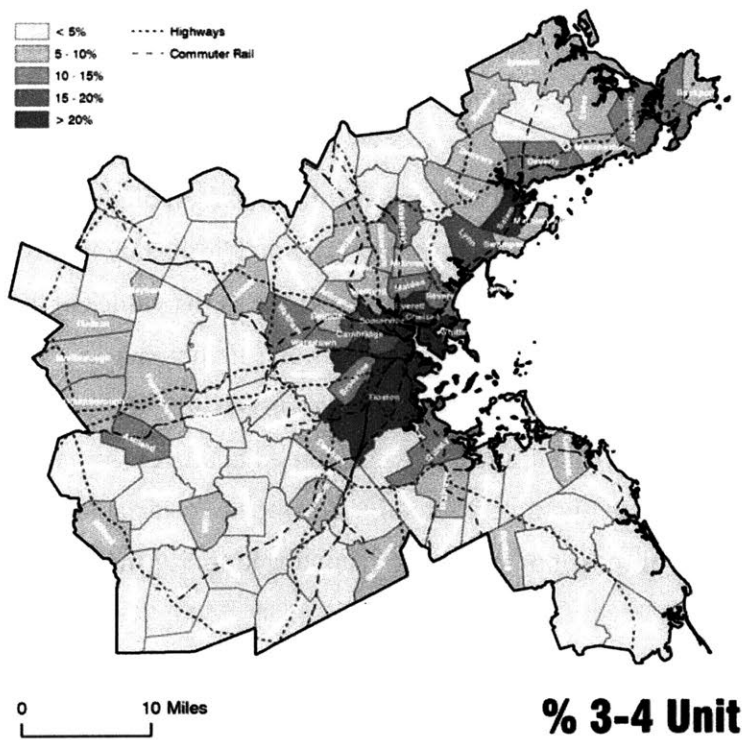


Figure 3.38: Metro Boston Share of Units in 3-4 Unit Structures
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

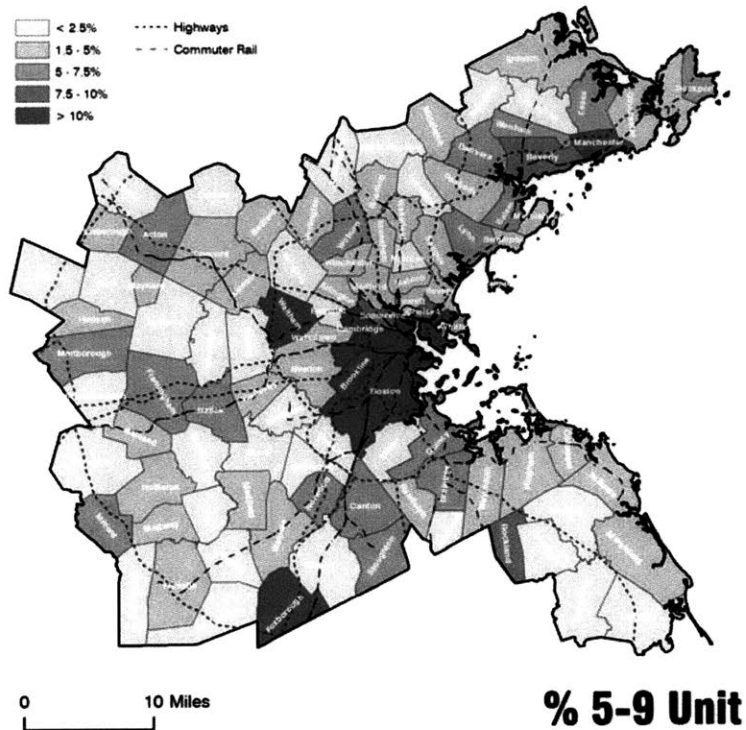


Figure 3.39: Metro Boston Share of Units in 5-9 Unit Structures
 (Data from U.S. Census Bureau, ACS 2015 5-Year Estimates)

Housing Stock & Demographic Correlations

To help describe the kinds of communities whose housing stock contains large proportions of Missing Middle typologies, we can correlate the share of a municipality’s housing units in Missing Middle structures to an array of town-level variables. Using a simple Pearson’s Correlation Coefficient (PCC), it is possible to observe relationships between a community’s demographic and economic indicators and the prevalence of existing Missing Middle housing types. The PCC indicates how tightly associated the values from one variable (X) are to the values of another (Y) on a scale of -1 to 1, with -1 indicating a perfectly negative correlation (an increase in X results in a proportional decrease in Y), 1 indicating a perfectly positive correlation (an increase in X results in a proportional increase in Y), and 0 indicating that X and Y are not related at all. It is important to note that while a PCC analysis is able to illustrate linear relationships between two variables, it a) cannot be used if the relationship is not linear (at least not without a transformation of the variable in question) and b)

does not hold all other factors constant as would a proper linear regression analysis, a process which is outside the scope of this research¹.

The table in Figure 3.40 highlights some of the most highly correlated variables and some that are surprisingly uncorrelated. Inner Core communities (0.73), communities with high percentages of pre-1940 units (0.76), communities with high percentages of households that moved between 2010 and 2015 (0.82), communities with high percentages of 0-2 bedroom units (0.84), and communities with high percentages of households that own at most one car (0.85) are most positively correlated with the presence of Missing Middle typologies. Of course, in many cases, these characteristics refer the same communities as Inner Core communities are themselves highly correlated with the presence of older buildings, recent transplants, small units, and low vehicle ownership.

Negatively correlated characteristics include the percentage of family households (-0.75), the percentage of owner-occupied households (-0.89), and the percentage of single-family detached units (-0.93). Again, the Inner Core communities in which Missing Middle units are found are themselves less likely to contain family households or owner-occupied households due to the composition of their housing stocks, making these relationships somewhat expected. The negative correlation between single-family detached units and the presence of Missing Middle structures, though seemingly obvious, is actually a point of interest. While it is true that any increase in the share of single-family units will reduce the potential share of Missing Middle units, the fact that the share of large multi-family units is actually *positively* correlated with Missing Middle types (0.51) could indicate that Metro Boston's cities and towns have tended to draw a distinct line between single-family homes and Missing Middle types. It could also be an artifact of Metro Boston's development history, where the towns that had reason to build small multi-family units in the past have subsequently seen pressure to densify further, whereas towns that developed in a more single-family manner have not yet densified into even Missing Middle typologies.

Interestingly, employment and wage characteristics of a given town are not particularly correlated with the existence of Missing Middle housing types. Due to the relative dispersion of jobs in the region and the relative concentration of Missing Middle housing, this is not too much of a surprise. Further, without the aid of a more detailed regression analysis, it cannot be said that employment *within* the Inner Core is not a determining factor. Still this finding may indicate that while proponents claim that Missing Middle units are able to provide suburban-style living at

¹ While a regression analysis was explored, the results proved inconclusive due to almost no variables displaying statistical significance at the 95% confidence level. This is likely due to the high rates of collinearity between many of the variables.

densities more befitting of mixed-use job- and amenity-rich locations, the Boston region’s current development distribution does not allow for these benefits to be realized.

Existing Missing Middle Housing Correlations			
<u>Community Type</u>	<u>PCC</u>	<u>Demographics</u>	<u>PCC</u>
Inner Core	0.73	2015 Population	0.39
Regional Urban Centers	0.24	Median Age	-0.54
Maturing Suburbs	-0.39	% under 18	-0.56
Developing Suburbs	-0.33	% White	-0.50
<u>Households</u>	<u>PCC</u>	<u>Housing Units</u>	<u>PCC</u>
% Family HH	-0.75	% Built pre-1940	0.76
Average HH Size	-0.52	% 0-2 BRs	0.84
% Owner-Occupied HH	-0.89	% ≤ 1 Occupant/Rm	-0.56
% Moved '10-'15	0.82	Home Value (Owner Occupied)	-0.31
% 0-1 Vehicles	0.85	% Single-Family Detached	-0.93
Housing Cost Burdened (ACS SMOCAPI > 30%)	0.56	% Large Multi-Family	0.51
Median Household Income	-0.46		
<u>Employment</u>	<u>PCC</u>	<u>Wages</u>	<u>PCC</u>
Total Workers	0.30	Total Wages	0.28
Total Firms	0.33	Average Weekly Wage	-0.03
Employment-Population Ratio	-0.02		
Firm Size	0.16		

Figure 3.40: Metro Boston Missing Middle Housing Correlations
(Data from independent analysis of U.S. Census Bureau, ACS 2015 5-Year Estimates)

Unit-Level Characteristics

In addition to the housing-related questions on the American Community Survey, the Census Bureau also operates the American Housing Survey (AHS). Performed every two years, this more detailed survey included additional questions on housing characteristics as well as some basic demographic data. While AHS data is not available at the town level, detailed cross-tabulations are distributed for major metropolitan areas. Though these responses will not indicate the town of residence, this dataset will allow for more specific exploration of who occupies Missing Middle housing types throughout Metro Boston and provides greater detail of the units themselves. It is

important to note, however, that the AHS' definition of Metro Boston does not align perfectly with MAPC's, making exact connections between the AHS and ACS data somewhat difficult.

The AHS estimates there to be about 1,917,300 total units in the Boston MSA as of 2015, of which 1,838,400 are occupied. 50.3% of occupied units are single-family detached, 15.3% are in large multifamily structures, and 33.3% fall into the Missing Middle range (Figure 3.41). Within this category, 2-4 unit structures make up the largest share at 21.8% of all units, owing to the prevalence of stacked duplexes and triple-deckers in the region. The increased prevalence of single-family detached homes in these figures is an artifact of the AHS metro Boston definition which occupies a wider geography and incorporates more suburban communities into the analysis zone.

% of Occ. Units by Units in Structure

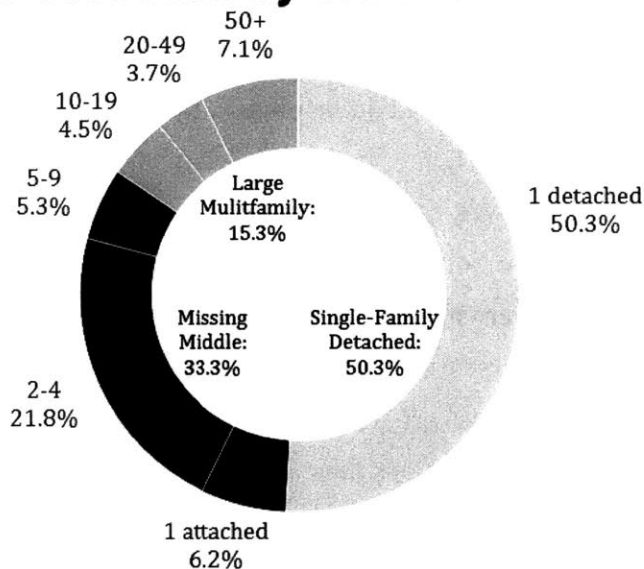


Figure 3.41: Metro Boston AHS Housing Units by Units in Structure
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Vacancy rates for units in the region are not constant across structure types (Figure 3.42). Rates for single-family detached and attached units barely break the 2% threshold and units in 2-4 and 10-19 unit structures hover around 3%. These low vacancy rates are usually markers of current or impending housing unaffordability, as they indicate that supply is not keeping up with demand (Kasulis, 2016). Only units in 5-9 and 50+ unit structures approach the 6% experts point to as a healthy vacancy rate needed to stabilize rents. Though large buildings have been built at a relatively high rate in recent years, 5-9 unit structures have not; therefore, it is likely that the high vacancy rate for units in larger buildings is driven by increasing supply while the high vacancy rate for units in 5-9 unit buildings is quite possibly due to lower demand.

Vacancy Rate

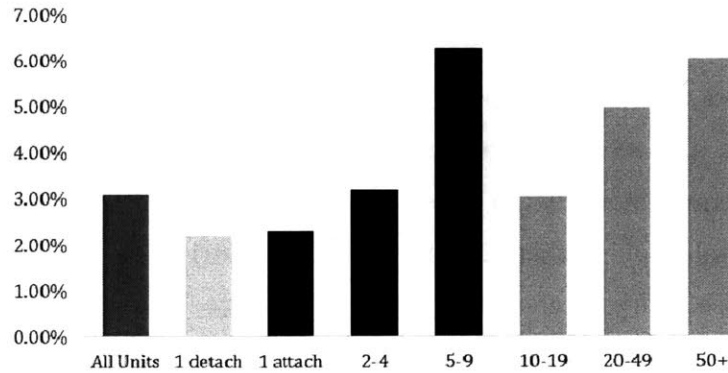


Figure 3.42: Metro Boston Housing Vacancy Rates
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Unit age is also markedly different across structure types. Indeed, while the median year of construction for all units is 1957, Missing Middle units in the region vary from this rather drastically (Figure 3.43). Single-family attached homes have been relatively steadily constructed since the 1970s and have a median year built of 1983. 2-4 unit structures, on the other hand, were largely built prior to 1920 and have not been built in any real numbers since 1930, resulting in a median year built of 1922. New 5-9 unit structures were also much more common before 1920, but a slight renaissance from 1950-1990 and another burst from 2000-2010 raise the median year built to 1957. Single-family detached units from all decades are relatively well-represented, but a post-World War II spike is clearly evident. Large multifamily homes have seen more construction more recently, especially structures with 20 or more units.

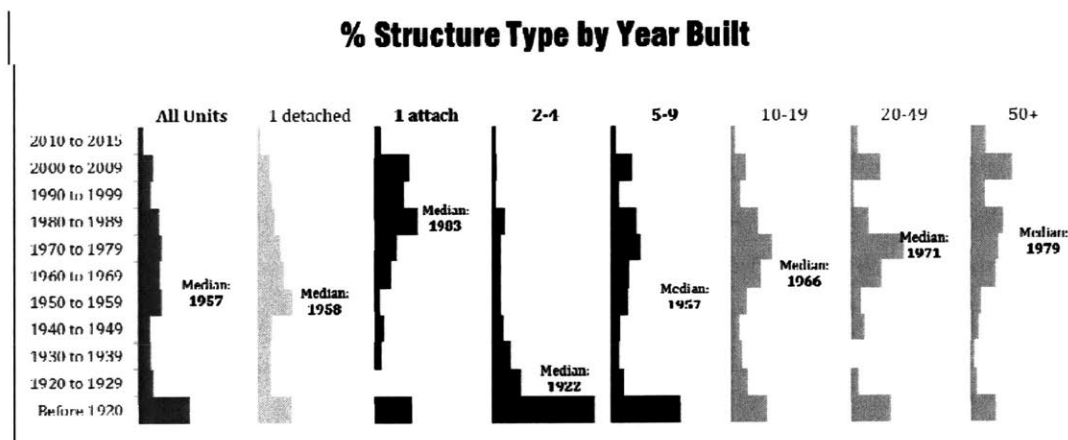


Figure 3.43: Metro Boston Housing: % Structure Type by Year Built
(Data from U.S. Census Bureau, 2015 American Housing Survey)

When we compare structure types within a construction year cohort, we can further see that Missing Middle units are no longer as well represented in new construction in the region (Figure

3.44). In fact, as a share of all existing units built prior to 1940, units in 2-4 unit structures account for a whopping 41%. When combined with single-family attached homes and units in 5-9 unit structures, Missing Middle units account for 50% of all pre-war units in existence today. This figure has been reduced to under 30% of units constructed from 2010-2015, with units in larger multifamily buildings making up the difference. As with the national data, the Missing Middle’s shrinking share could indicate two different scenarios. This trend may simply be a reflection of the increasing ability of developers to achieve density through larger buildings thanks to economies of scale and building technologies not available in the early part of the last century bumping up against consistent demand for single-family detached housing. Alternatively, it may point to the limiting effects of restrictive zoning on the overall densification of the regional housing stock.

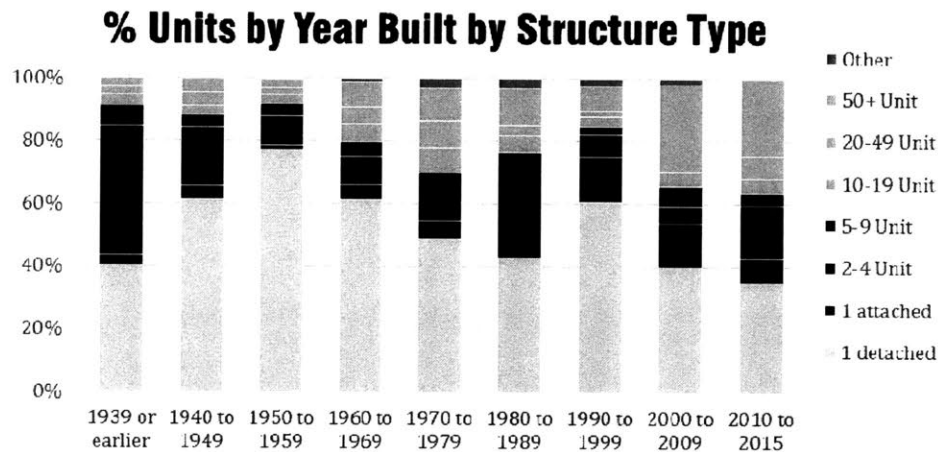


Figure 3.44: Metro Boston Housing: % of Units by Year Built by Structure Type
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Not surprisingly, Missing Middle units are smaller than those of single-family detached homes, and generally larger than those in large multifamily dwellings (Figure 3.45). Indeed, even within the Missing Middle range, as the number of units in a given structure increases, its unit sizes decrease with single-family attached homes clocking in at 1400 square feet, units in 2-4 unit structures at 1100 square feet, and units in 5-9 unit structures at 770 square feet. The median single-family home, however, has an area of 2,000 square feet while the median unit in a large multifamily structure ranges between 800-840 square feet, likely due to the prevalence of recently constructed luxury high-rise buildings with larger unit sizes.

Missing Middle units are also slightly more cramped than their single-family detached counterparts (770sf/occupant) and slightly roomier than units in large multifamily structures (445-600sf/occupant) with a median area-per-occupant between 512-625sf (Figure 3.46).

Median Unit Size (square feet)

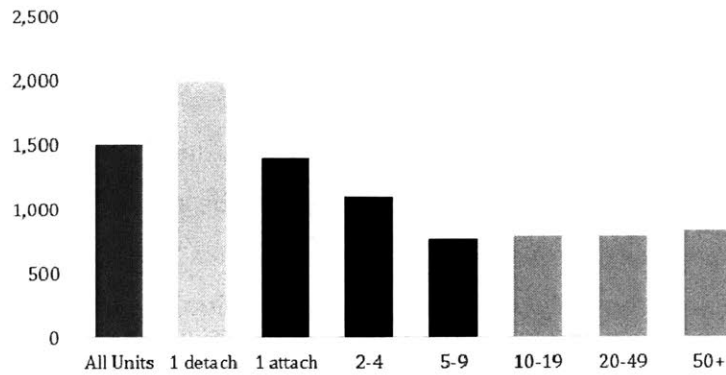


Figure 3.45: Metro Boston Housing: Median Unit Size (square feet)
 (Data from U.S. Census Bureau, 2015 American Housing Survey)

Median Square Feet per Occupant

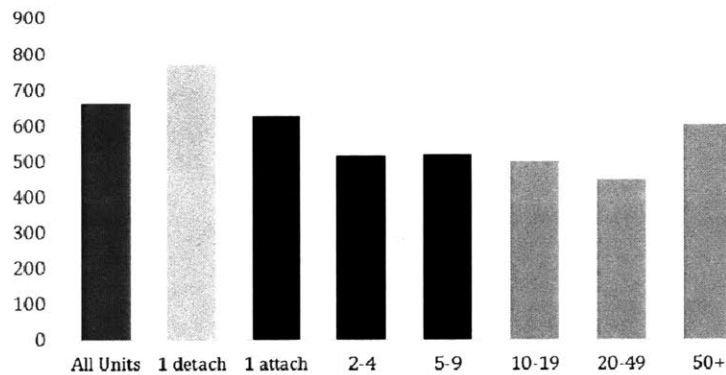


Figure 3.46: Metro Boston Housing: Median Unit Size per Occupant (square feet)
 (Data from U.S. Census Bureau, 2015 American Housing Survey)

Owner-occupied Missing Middle units are valued below single-family detached homes and generally above large multifamily units (Figure 3.47), although, somewhat surprisingly, the median value of an ownership unit in a 5-9 unit structure (\$385k) approaches that of a median single-family detached unit (\$400k). What’s more, the unit type with the highest median value is actually that of the 50+ unit structure (\$420k), again owing to the recent surge in luxury high-rise housing development.

When these valuations are compared to household income, Missing Middle units are found to be on par with single-family detached homes (Figure 3.48). Ownership units in large multifamily structures, however, generally have considerably higher value-to-income ratios, indicating that residents of these units are more housing-cost burdened than those in single-family detached or Missing Middle type units.

Median Home Value (Owner-Occupied)

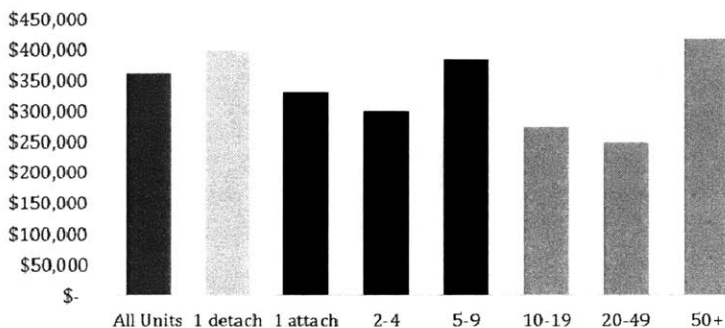


Figure 3.47: Metro Boston Housing: Median Home Value (owner-occupied)
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Median Home Value to Income Ratio (Owner-Occupied)

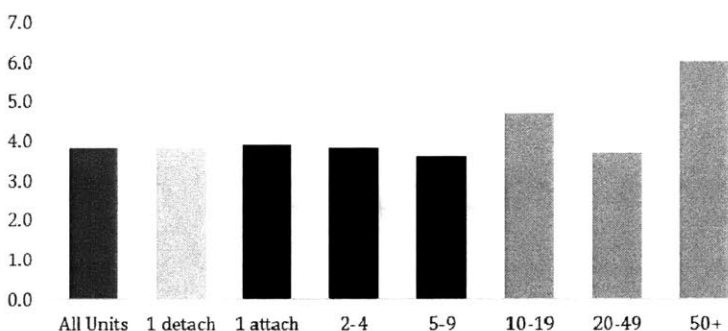


Figure 3.48: Metro Boston Housing: Median Home Value / Income ratio
(Data from U.S. Census Bureau, 2015 American Housing Survey)

These discrepancies are further reinforced when median monthly housing costs are examined. Generally, housing costs decrease as structure size increases with single-family detached homes coming in at \$1,548/mo and outlays for units in 50+ unit structures measuring \$992/mo, though units in 10-19 and 20-49 unit structures break this trend (Figure 3.49). While home values were highest for ownership homes in 50+ unit structures, the monthly housing cost spike for mid-rise structures could indicate the higher relative ratio of luxury rental development at this scale compared to the prevalence of condominiums at the 50+ unit end of the spectrum.

Despite the generally lower monthly housing costs of units in larger structures, these costs make up a larger percentage of household income, approaching 30% - the widely accepted threshold for what is considered housing-cost burdened (Figure 3.50). Missing Middle housing-cost-to-income

ratios, on the other hand, are in the mid-20s and the median percentage for single-family detached houses sits at 18%.

Median Total Monthly Housing Costs

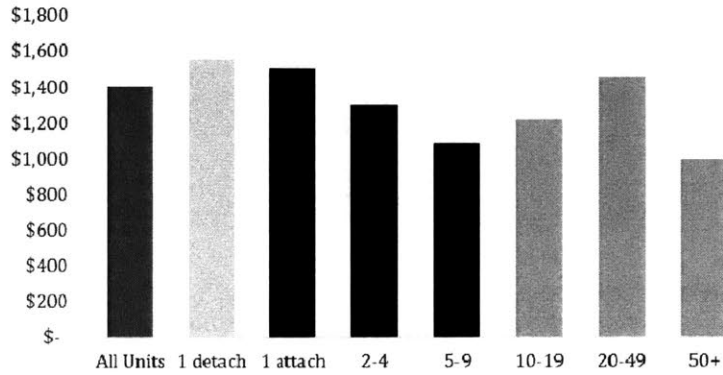


Figure 3.49: Metro Boston Housing: Median Total Monthly Housing Costs
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Median Total Monthly Housing Costs as % of Household Income

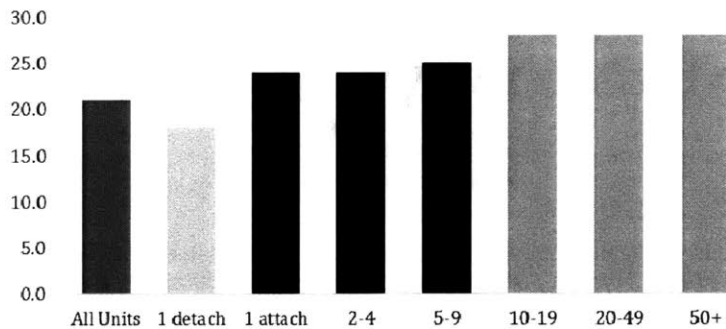


Figure 3.50: Metro Boston Housing: Median Monthly Housing Costs as % of Income
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Interestingly, as seen in Figure 3.51, the median purchase price of ownership units in 2-4 unit structures (\$266.5k) is second only to the luxury housing of 50+ unit structures (\$329.9k). Why this is the case is not known, considering conventional wisdom holds that buyers tend to discount units in shared structures. One potential reason is that although single-family detached homes can be incredibly expensive in the region, the lower median purchase price for these units is likely due to the wider range of prices. While ownership units in 5-9 unit structures are priced lower than single-family detached homes, single-family attached homes demand similar median purchase prices to their detached counterparts. This variation has mixed implications for both the affordability and marketability of Missing Middle units.

Median Purchase Price (Owner-Occupied)

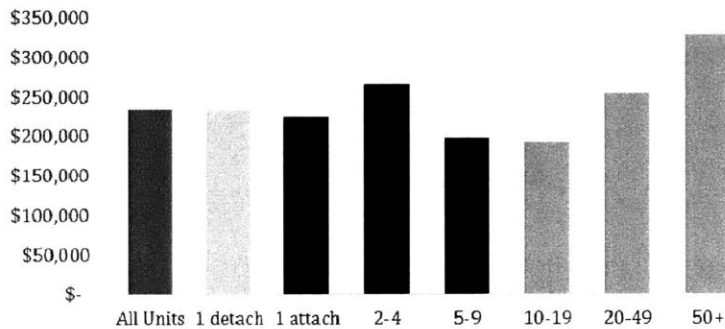


Figure 3.51: Metro Boston Housing: Median Purchase Price
(Data from U.S. Census Bureau, 2015 American Housing Survey)

When examining the household-level demographic data of Greater Boston’s housing units, we can see some additional interesting trends. First, Missing Middle inhabitants tend to be more racially and ethnically diverse, with lower shares of white householders and higher shares of black and Hispanic/Latino householders than in either single-family detached or large multifamily units (Figure 3.52).

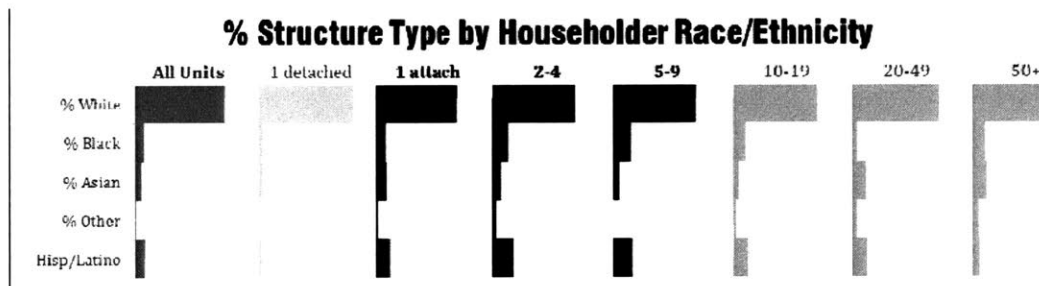


Figure 3.52: Metro Boston: % Structure Type by Householder Race/Ethnicity
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Householders in Missing Middle units are also younger than those in single-family detached homes, but older than residents of larger multifamily structures, with the exception of 50+ unit structures – likely due to these units often being part of senior living complexes (Figure 3.53).

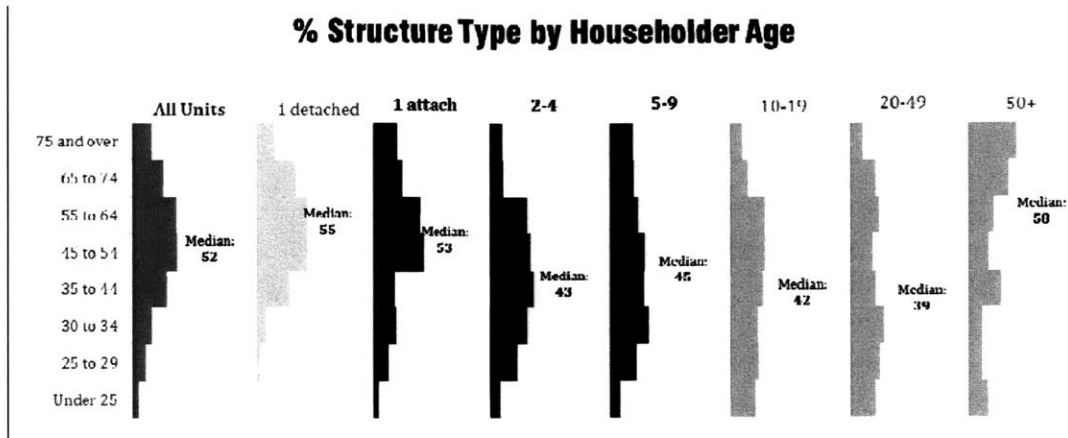


Figure 3.53: Metro Boston Housing: % Structure Type by Householder Age
 (Data from U.S. Census Bureau, 2015 American Housing Survey)

Because median householder age is slightly higher in Missing Middle units than it is in large multifamily, these households are more likely to have children (Figure 3.54). Still, with the curious exception of single-family attached units, a smaller share of Missing Middle homes have children than is the case in single-family detached units. This could indicate the fact that while Missing Middle units are possibly more “family friendly” than larger multifamily structures, they do not tend to house as many children as single-family detached homes – an interesting point to consider when municipal tax burdens and school spending discussions arise in the context of small multifamily development.

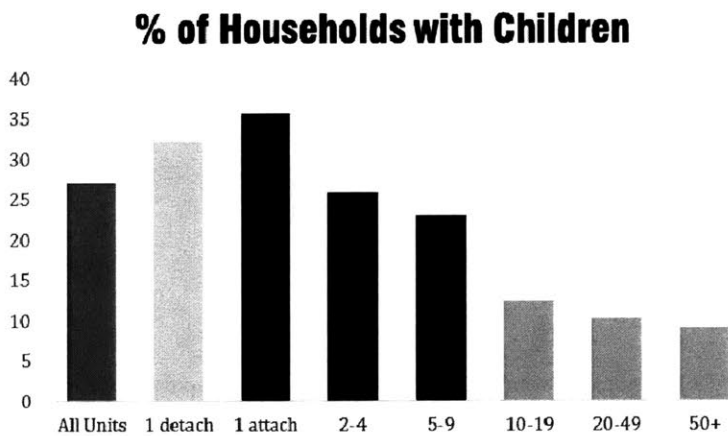


Figure 3.54: Metro Boston Housing: % of Households with Children
 (Data from U.S. Census Bureau, 2015 American Housing Survey)

Likely due to the presence of fewer children, Missing Middle units also have smaller average household sizes than single-family detached units, but larger households than units in large multifamily structures (Figure 3.55). By occupying the middle ground of average household sizes, Missing Middle units can be said to appeal to both small and large households, potentially allowing for greater diversity of household types within a given neighborhood.

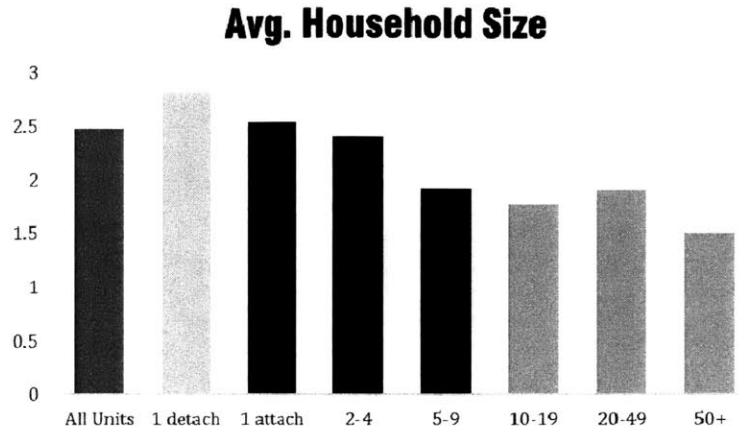


Figure 3.55: Metro Boston Housing: Average Household Size
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Missing Middle units also tend to house fewer residents 65 years or older than single-family detached homes, but more than large multifamily homes, with the exception, again, of 50+ unit structures, many of which are developed purposefully as senior residences (Figure 3.56).

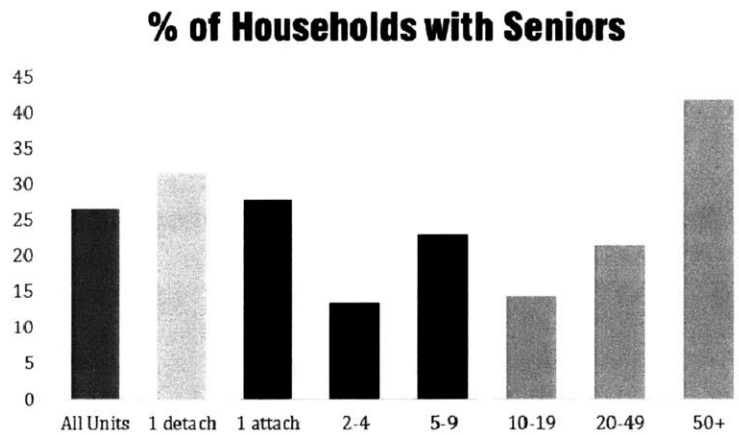


Figure 3.56: Metro Boston Housing: % of Households with Residents 65 or over
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Whether due to design, location, or age, Missing Middle units also tend to be occupied by households of middle incomes, with median household incomes falling between \$47k-\$70, higher than those of larger multifamily units and lower than those of single-family detached units (Figure 3.57). While this does not necessarily point to any inherent affordability of these units, it at the very least indicates that middle income households are currently willing to occupy such units.

Median Household Income

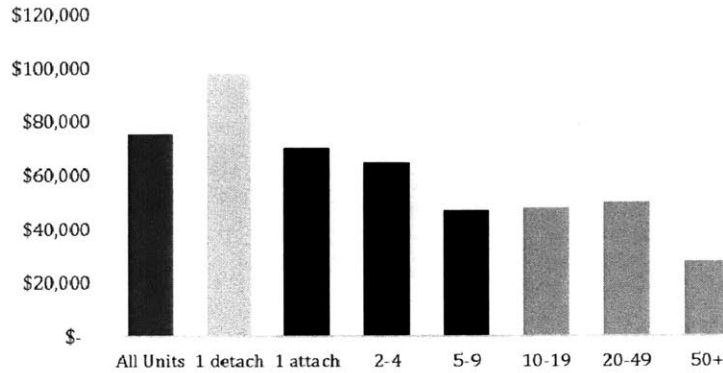


Figure 3.57: Metro Boston Housing: Median Household Income
(Data from U.S. Census Bureau, 2015 American Housing Survey)

AHS data also allows for the review of the neighborhoods in which Missing Middle housing exists and the examination of residents' opinions about the area around their homes. In terms of neighborhood structure, Missing Middle units are often just as likely to be sited in single-family neighborhoods as they are in multifamily or even mixed use neighborhoods (Figure 3.58). Single-family attached units in particular can be found in a variety of environments. Single-family detached homes, on the other hand, are almost exclusively found surrounded by other single-family detached homes, and large multifamily structures are more commonly bordered by other multifamily buildings or mixed use developments.

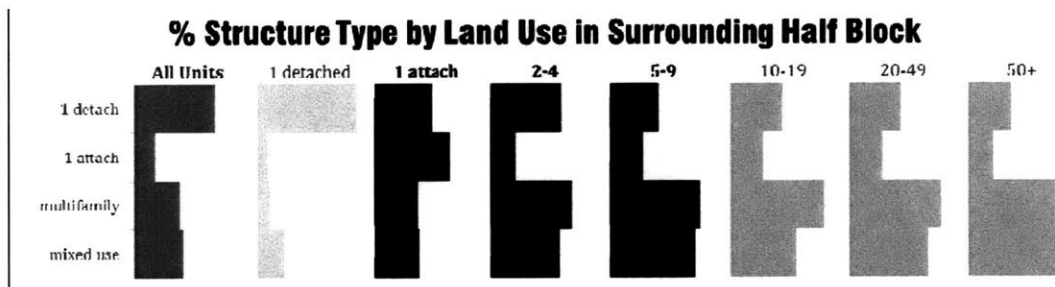


Figure 3.58: Metro Boston: % Structure Type by Land Use in Surrounding Half Block
(Data from U.S. Census Bureau, 2015 American Housing Survey)

When asked to comment on the positives and negatives of their neighborhoods, around 77% of Missing Middle residents stated the area had good schools, lower than the 91% reported for single-family detached residents, but higher than occupants of large multifamily units, with the exception of residents in 50+ unit buildings (Figure 3.59). Further, opinions of transit access for Missing Middle residents compare favorably to large multifamily respondents, and are considerably better than those of single-family detached residents (Figure 3.60). However, both petty crime (Figure 3.61) and

serious crime (3.62) are stated to be more prevalent in Missing Middle neighborhoods than either single-family detached or most large multifamily districts, although these raw percentages are still relatively low.

**Neighborhood has Good Schools:
% Agree**

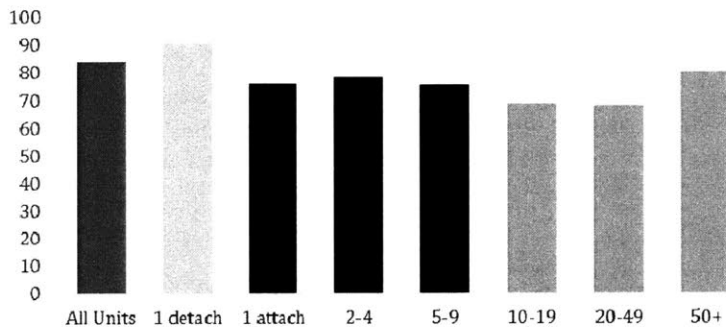


Figure 3.59: Metro Boston Housing: % Approve of Neighborhood Schools
(Data from U.S. Census Bureau, 2015 American Housing Survey)

**Neighborhood has Good Transit:
% Agree**

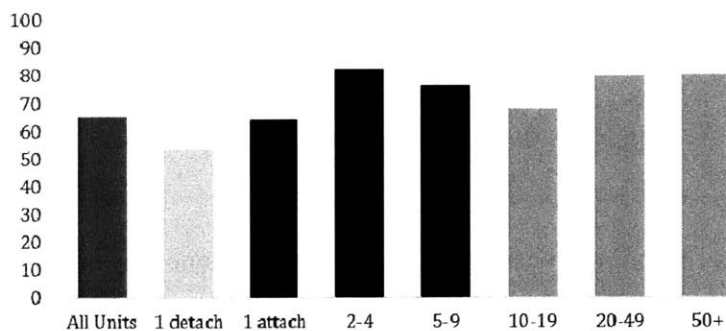


Figure 3.60: Metro Boston Housing: % Approve of Neighborhood Transit
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Neighborhood has Petty Crime: % Agree

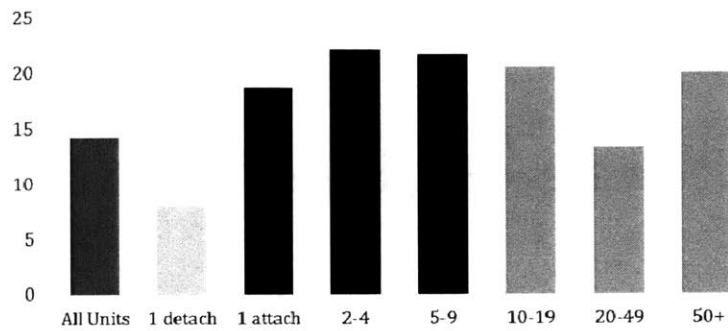


Figure 3.61: Metro Boston Housing: % Concerned about Neighborhood Petty Crime
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Neighborhood has Serious Crime: % Agree

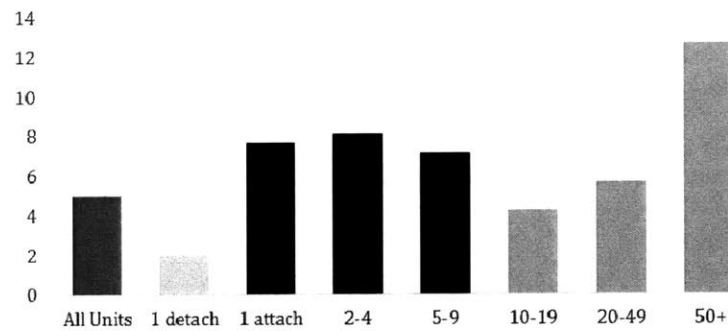


Figure 3.62: Metro Boston Housing: % Concerned about Neighborhood Serious Crime
(Data from U.S. Census Bureau, 2015 American Housing Survey)

Likely owing to this combination of good city services and concerns of crime, we see that overall opinions of Missing Middle neighborhoods are generally good but not great, falling between the high marks of single-family detached areas and the lower ratings for large multifamily districts (Figure 3.63). A similar trend is evident in the stated overall opinion of the home itself, with responses being generally positive – better than those of large multifamily residents, but not as lofty as occupants of single-family detached homes (Figure 3.64).

% Structure Type by Overall Opinion of Present Neighborhood

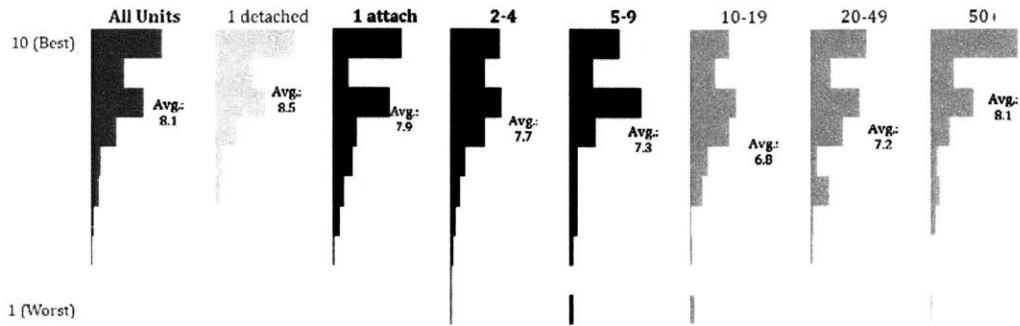


Figure 3.63: Metro Boston: % Structure Type by Overall Opinion of Present Neighborhood
(Data from U.S. Census Bureau, 2015 American Housing Survey)

% Structure Type by Overall Opinion of Present Home

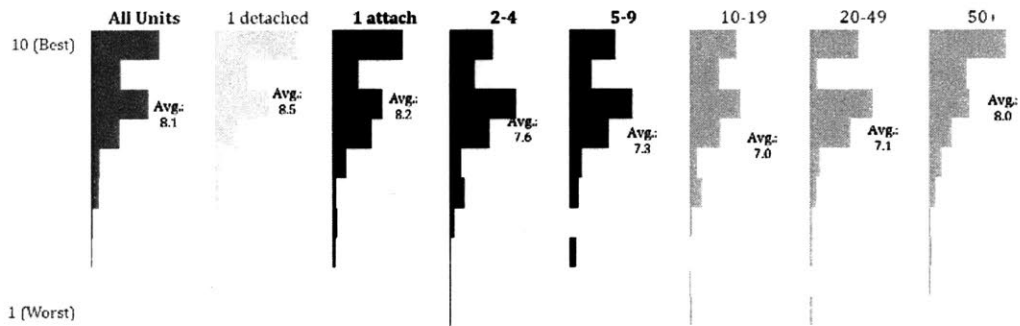


Figure 3.64: Metro Boston: % Structure Type by Overall Opinion of Present Home
(Data from U.S. Census Bureau, 2015 American Housing Survey)

While the data does not indicate why Missing Middle units are balanced between these poles, it stands to reason that the age of this housing and its historical connection to working class neighborhoods have created a situation in which much of the remaining Missing Middle stock is located in older, more forgotten areas of cities and towns. In the next section, I explore the town-by-town locations of new Missing Middle units by examining Census permit data in order to understand the kinds of communities that do and do not pursue their development.

Permitted Housing Stock

By analyzing the town-by-town building permit data collected by the U.S. Census Bureau through the Building Permits Survey (BPS), we can better understand where new Missing Middle units are being built and explore the potential reasons for variations. While the data of the Building Permits

Survey is self-reported and often incomplete², it is the only comprehensive dataset available to estimate new building construction below the MSA level. What's more, whereas ACS and AHS data separates structure sizes rather finely, BPS data only records, 1 unit, 2-4 unit, and 5+ unit results. Therefore, single-family attached homes and units in 5-9 unit structures will unfortunately need to be ignored for this analysis, resulting in 2-4 unit buildings serving as the only proxy for the Missing Middle.

According to the BPS, from 1980-2015 over 265,000 total units were permitted in the MAPC Boston Metro Area. Of these 134,000 (50.5%) were single-family homes (both detached and attached), 113,000 (42.5%) were in buildings with 5 or more units, and only 7% were in 2-4 unit structures. Over this period, both the total number of units permitted and the shares of the various structure types fluctuated greatly.

In terms of overall units, a swell in construction of all unit types can be seen during the mid-1980s (Figure 3.65), followed by a decline during the economic downturn of the early 1990s. Interestingly, unlike with the national permit data explored in Chapter 2, the housing boom of the early- to mid-2000s was much more prominent in the large multifamily sector than the single-family sector regionally. Indeed, since the recovery of the 2008 Great Recession, it is large multifamily units that have seen the largest rebound, with total annual permits exceeding the previous zenith in the 1980s. Units in 2-4 unit structures, on the other hand, saw a slight increase during the early 2000s boom, but have fallen flat since.

As a share of overall permits, Missing Middle units in the region have hovered in the 5-10% range for the past 35 years, landing at 3.9% in 2015 (Figure 3.66). Single-family homes, in the meantime, accounted for as much as 87% of permits in the 1990s, but have fallen into the 20-30% range in the past 5 years, despite a modest recovery from the collapse of the housing bubble. Conversely, while large multifamily permitting hit its nadir during single-family's peak in the 1990s, it has now grown to account for a dominating majority of new permits, hitting a mark of nearly 75% in 2015.

By honing in on just the permit figures for 2-4 unit structures, we can see that the recovery from the most recent recession has been more sluggish than that of the 1990s (Figure 3.67). What's more, despite this modest increase, the share of these units has continued to fall due to the rapid rise in large multifamily development.

² A full explanation of the BPS' methodology is available here:

https://www.census.gov/construction/bps/how_the_data_are_collected/. Among the concerns with data reliability include the imputation of unreported permits, the lack of consistency for how to deal with Planned Urban Development units, the somewhat confusing language of the survey questionnaires, and the simple fact that relying on a town's building inspection department to voluntarily collect, analyze, and report this information is problematic considering the time needed to do so.

Total Annual Permitted Units by Structure Size: 1980-2015

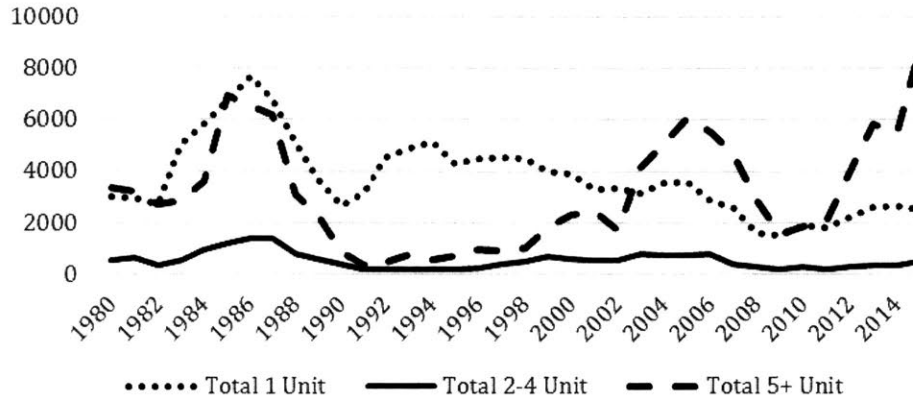


Figure 3.65: Metro Boston: Total Annual Permitted Units by Structure Size: 1980-2015
(Data from U.S. Census Bureau, Building Permits Survey)

Annual % of Permitted Units by Structure Size: 1980-2015

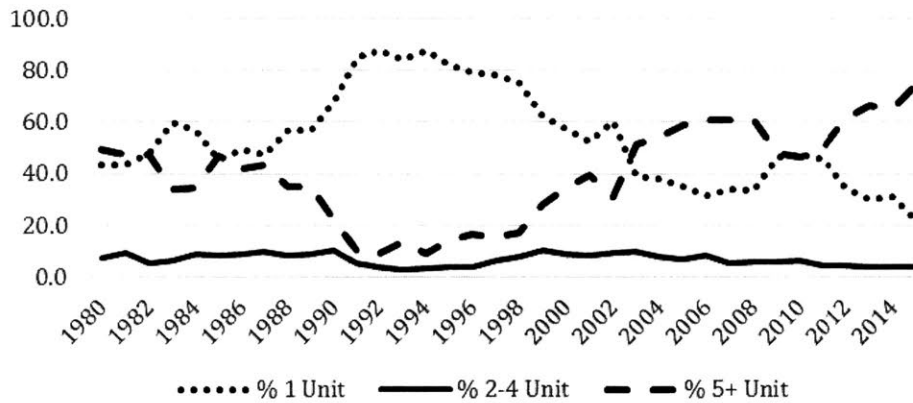


Figure 3.66: Metro Boston: Annual % of Permitted Units by Structure Size: 1980-2015
(Data from U.S. Census Bureau, Building Permits Survey)

Permitted Units (Total & %) in 2-4 Unit Structures: 1980-2015

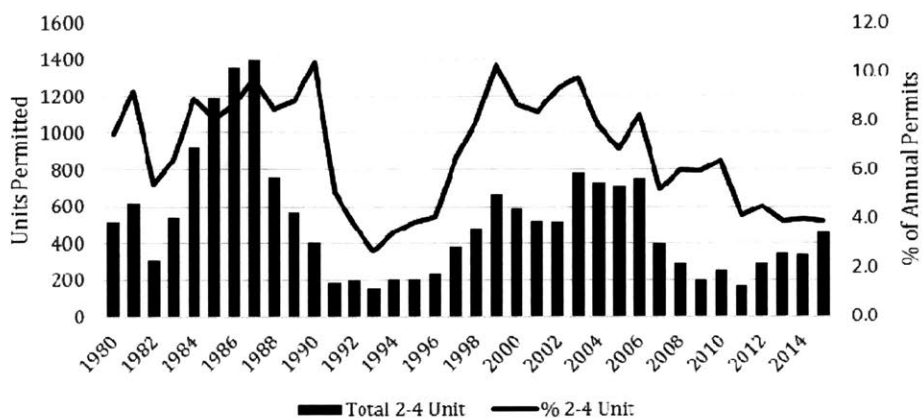


Figure 3.67: Metro Boston: Permitted Units in 2-4 Unit Structures: 1980-2015
(Data from U.S. Census Bureau, Building Permits Survey)

While Missing Middle typologies have been in decline for decades, the remainder of this analysis will focus just on the past six years of available data, from 2010 to 2015. By excluding data prior to 2010, the direct effects of the Great Recession are able to largely be ignored, while the lasting indirect effects and lagging economic recovery will be impossible to remove from consideration. Still, this period is the most recent in which the permitting of all unit types are not hampered by an economic downturn. During this period, 43,257 total units were permitted in the region (Figure 3.68): 13,655 single-family homes (31.6%), 1842 units in 2-4 unit structures (4.3%), and 27,760 in 5+ unit buildings (64.2%).

Permitted Units by Structure Type: 2010 - 2015



Figure 3.68: Metro Boston: Total Permitted Units: 2010-2015
(Data from U.S. Census Bureau, Building Permits Survey)

Spatially, these units also display considerable variation. In terms of overall units, Boston is of course the main contributor, permitting 13,269 total units in that span. The city with the next-highest rate, Cambridge, permitted just under 2,300 units. In general, Inner Core communities were the most active in the new housing market, with the median such municipality permitting 465 units from 2010-2015. Again, in addition to the urban core, communities located along rail and highway corridors have tended to be those that permit the most units (Figure 3.69).

When we compare permitted units over this period to the existing households in each town in 2010, however, we see a very different story unfold. While central communities have permitted large absolute numbers of units, it is actually the more distant suburbs that are growing at a faster rate with Boxborough and Concord in particular eclipsing a growth rate of over 14% (Figure 3.70). This aligns with the popular national narrative of increasing year-over-year growth in the suburbs (Kolko, 2017). However, it is unclear whether this indicates an increasing preference for low-density living, a reflection of comparatively limited unit production in communities of more moderate densities, or the inability of many to afford the more centralized locations they prefer.

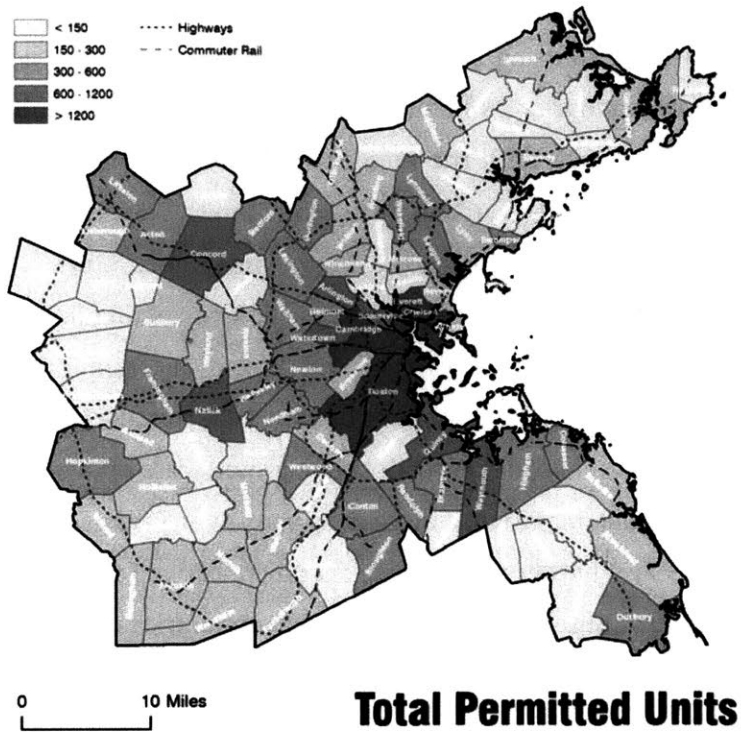


Figure 3.69: Metro Boston: Total Permitted Units: 2010-2015
 (Data from U.S. Census Bureau, Building Permits Survey)

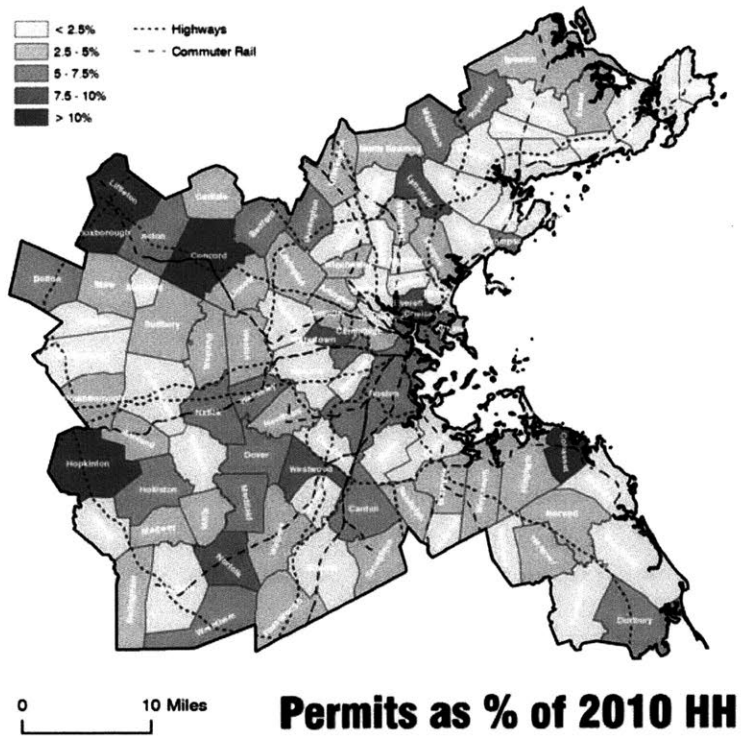


Figure 3.70: Metro Boston: Total Permitted Units as a % of 2010 Households: 2010-2015
 (Data from U.S. Census Bureau, Building Permits Survey)

Indeed, in most of these fast-growing communities, as well as the majority of their suburban neighbors, single-family homes are the most prevalent typology to be permitted, with 23 communities exclusively permitting such units and 13 others seeing over 90% of their total permits take the form of single-family homes (Figure 3.71).

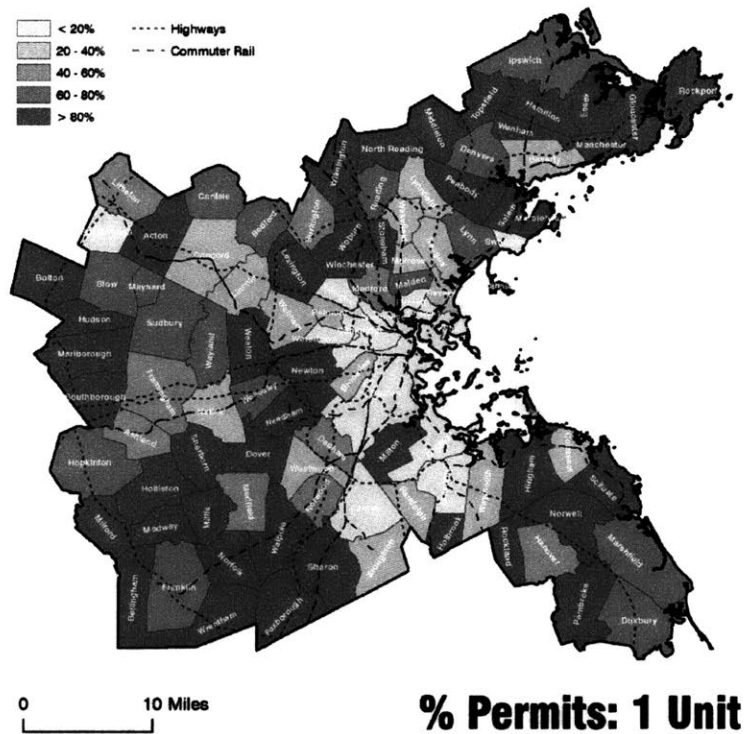


Figure 3.71: Metro Boston: Total % of Permitted Units in 1 Unit Structures: 2010-2015
 (Data from U.S. Census Bureau, Building Permits Survey)

Notwithstanding several exceptions in the western suburban reaches, permits for units in 5+ structures are overwhelmingly centered in the urban core (Figure 3.72). What's more, while 10 cities like Boston, Cambridge, Chelsea, Everett, and others saw more than 90% of their permits go to units in large multifamily buildings, 41 communities permitted no such units according the BPS. Where large multifamily was permitted in the suburbs, it is likely that these projects were due to 40B developments, such as the 350-unit complex built in 2011 in Concord (Lefferts, 2011).

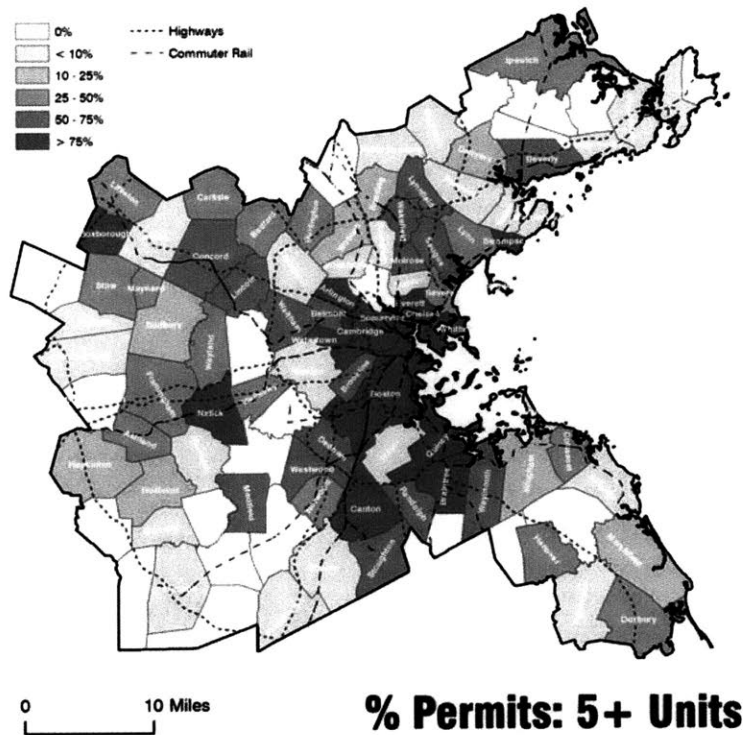


Figure 3.72: Metro Boston: Total % of Permitted Units in 5+ Unit Structures: 2010-2015
 (Data from U.S. Census Bureau, Building Permits Survey)

Finally, Missing Middle units, represented here by units in 2-4 unit structures, tend to be centered in the Inner Core, and the first ring suburbs of Medford, Arlington, and Revere in particular (Figure 3.73). Again, with notable exceptions in the areas around Gloucester and Framingham, where such units comprise upwards of 10% of all permitted units, the second- and third-ring suburbs permitted very small shares of Missing Middle units, with 44 communities permitting none, an additional 14 towns seeing less than 2% of their permitted units fall in this range, and a full 69 towns – over two thirds of the region – fall below the regionwide percentage of 4.3%.

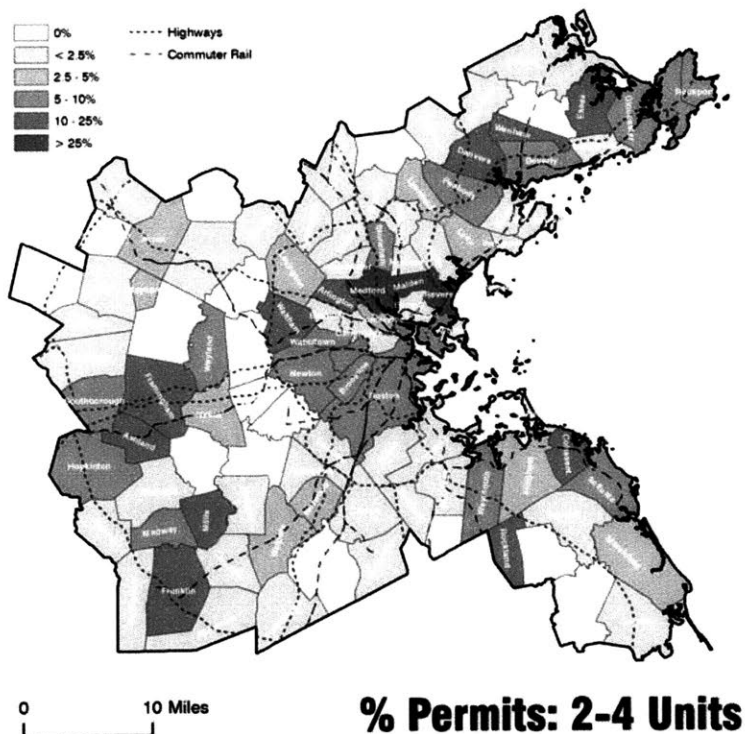


Figure 3.73: Metro Boston: Total % of Permitted Units in 2-4 Unit Structures: 2010-2015
 (Data from U.S. Census Bureau, Building Permits Survey)

What explains this variation? While Chapter 4 will be dedicated to attempting to answer this question at a more refined scale, we can start by reviewing the town-by-town correlations between the share of permitted units in Missing Middle type structures and various demographic and economic factors (Figure 3.74). Using the same factors as the existing housing analysis earlier in this chapter, we can see that no town-level characteristic is particularly highly correlated with the share of newly permitted units in 2-4 unit structures. In fact, while several indicators have Pearson's Correlation Coefficients of +/- 0.8 or higher, the only determinant that crosses the +/- 0.4 mark is a community's current share of Missing Middle housing, with a PCC of 0.45. While this indicates some inertia for towns to continue to develop similar housing to their existing stock, the overall low

correlations analysis-wide also point to the break in historic clustering of Missing Middle structures. Though the factors here have the same *directional* effects on new Missing Middle units as they were found to have on existing units, their lower overall correlations indicate that demographics and employment are not adequate predictors of whether Missing Middle units will be developed. That is, while towns with higher incomes, more homeowners, and a larger proportion of white citizens are less likely to permit Missing Middle units, and communities that are already denser, more diverse, and have less auto-dependent residents are more likely to do so, the intensity with which these trends hold true is considerably lower than it has been historically.

Permitted Missing Middle Housing Correlations			
<u>Community Type</u>	<u>PCC</u>	<u>Demographics</u>	<u>PCC</u>
Inner Core	0.40	2015 Population	0.18
Regional Urban Centers	0.10	Median Age	-0.20
Maturing Suburbs	-0.22	% under 18	-0.30
Developing Suburbs	-0.15	% White	-0.15
<hr/>			
<u>Households</u>	<u>PCC</u>	<u>Existing Housing Units</u>	<u>PCC</u>
% Family HH	-0.31	% Built pre-1940	0.35
Average HH Size	-0.24	% 0-2 BRs	0.38
% Owner-Occupied HH	-0.35	% ≤ 1 Occupant/Rm	-0.22
% Moved '10-'15	0.33	Home Value (Owner Occupied)	-0.17
% 0-1 Vehicles	0.33	% Single-Family Detached	-0.39
Housing Cost Burdened (ACS SMOCAPI > 30%)	0.28	% Large Multi-Family	0.17
Median Household Income	-0.28	% Missing Middle Types	0.45
<hr/>			
<u>Employment</u>	<u>PCC</u>	<u>Wages</u>	<u>PCC</u>
Total Workers	0.10	Total Wages	0.09
Total Firms	0.12	Average Weekly Wage	-0.10
Employment-Population Ratio	-0.11		
Firm Size	-0.02		
<hr/>			
<u>Permitted Units</u>	<u>PCC</u>		
Total Units	0.07		
% 1 Unit	-0.20		
% 5+ Unit	-0.06		

Figure 3.74: Metro Boston Missing Middle Permitted Units Correlations
(Data from U.S. Census Bureau, ACS 2015 5-Year Estimates & Building Permits Survey)

Conclusion and Takeaways

In this chapter, I have introduced Greater Boston, reviewed its demographic geography, and explored its plans and regulations as they relate to Missing Middle development. I have shown that the expected population growth in the region, combined with the increase in proportions of aging residents and the hollowing of the area's middle class, will require not just substantially more housing units, but also specifically units that are affordable and appeal to both downsizing seniors and working families. These units will need to align with regional plans to develop in areas that already possess stable infrastructure, transportation, and community amenities and must be proximate to jobs, both in the Inner Core and the suburban employment centers. I've shown that despite this need, the concentration of wealth and racial inertia in many of Boston's suburbs, combined with tense battles waged over perceived overreach by state affordable housing laws and complicated town governance structures, results in a precarious position for those advocating Missing Middle housing, though legislation that promotes smart growth planning throughout the region is a start.

I have commented on Greater Boston's development history and illustrated its historical connection to Missing Middle housing types. I have documented the existence of these housing types throughout the region, and analyzed their relationships both to the communities in which they stand and to the demographic characteristics of their residents. In doing so, I have shown that Missing Middle typologies are currently concentrated in Inner Core communities and are positively correlated with town-level measures of diversity and compactness. The units themselves are often considerably older than their single-family detached or large multifamily counterparts, but otherwise occupy a middle ground between these poles in terms of home value and unit size. This middle position is also descriptive of Missing Middle residents' demographic makeup, as these units tend to house a population that is younger, more diverse, and less financially well-off than are found in single-family homes, but older, more white, and better off financially than residents of large multifamily structures. Where Missing Middle outperforms both of its housing alternatives are in its tendency to exist in neighborhoods with housing type and use mixes. Missing Middle residents' assessment of their neighborhoods, however, are more mixed, with approval of area amenities and transit faring better than single-family neighborhoods, but worse than large multifamily districts.

Finally, I trace the trends in permitting history in the region as it relates to Missing Middle units and show that the low rates of such development have only declined since the Great Recession, despite the rebound in single-family permitting and large multi-family permitting in particular.

However, while permitting numbers for Missing Middle units are considerably lower than they have been in recent history, and drastically lower than they were pre-war, mirroring the national data explored in Chapter 2, this trend is reversing. What's more, these units are not just being permitted in their historical home in the Inner Core, but are also seeing traction in several suburban communities. This implies some potential for Missing Middle typologies to meet regional planning goals of densifying suburban communities in a contextual manner. Still, the inconsistency in permitting from town to town, coupled with a lower strength of correlation between Missing Middle permit levels and town-level demographic factors when compared to correlations between existing Missing Middle units and town-level demographics introduces additional questions. Namely, what are the town-level barriers to the new development of the Missing Middle, and how do these factors vary from between municipalities. In the next chapter, I focus on three suburban communities with varying levels of Missing Middle permitting to address this question.

Chapter 4

The Missing Middle in MetroWest

In order to ground this analysis in a more specific geographic location than the entire Metro Boston region, I endeavored to select several case study communities. This more detailed approach is intended to achieve several goals. First, it allows for a more careful understanding of the extents of Missing Middle typologies within specific towns. Second, it permits a review of the design and urban form of these developments to determine how well both historic and recently permitted Missing Middle structures are living up to the claims of their advocates. Finally, a case study approach provides the opportunity to parse out potential barriers to this development through the review of town-by-town differences in permitting levels and a review of the regulatory and development landscapes within those towns. Therefore, the communities selected must be relatively similar in many aspects (demographic, geographic, transportation) but differing in their proclivity for permitting Missing Middle units.

In this chapter, I briefly touch on the extents of Missing Middle housing in the three selected towns, including recently permitted units. Next, I review the types and characteristics of existing Missing Middle units in the three towns and illustrate these with photographs of examples. I then use the results of semi-structured interviews to better understand what planners and developers in these towns think of Missing Middle housing and the barriers to its development.

Case Study Towns

Town Selection

While many case study selection methods tend to consist of carefully comparing across multiple metrics in order to control all non-permitting variables, a simpler approach was taken for this analysis. First, only communities deemed Maturing Suburbs according to MAPC's community type analysis were considered. These community type assessments are based on "land use and housing patterns, recent growth trends, and projected development patterns" (Metropolitan Area Planning Council, 2008b). Therefore, controlling by this classification ensures towns are sufficiently similar across these metrics. Maturing Suburbs, specifically were chosen to hone in on the kinds of

communities most often associated with the potential for Missing Middle housing according to advocates. That is, while Inner Core communities are far more likely to have a history of building Missing Middle housing types, they are generally more prone to further densification due to population growth and proximity to jobs and amenities. Though this market pressure for densification could be considered a barrier to the permitting of these units, it was not the focus of this research. Regional Urban Centers are also denser communities that do not truly reflect the kinds of neighborhoods that advocates offer as necessary of study. Further, these communities tend to be more singular in occurrence, with only 11 such municipalities in the metro region. Conversely, Developing Suburbs, a lower density town typology, are generally not composed of the kinds of compact, single-family neighborhoods that tend to support Missing Middle development. This leaves Maturing Suburbs as the most reasonable community type in which to explore the Missing Middle.

The next criterion was the geographic proximity of selected towns. For one, a similar location ensures similar distances to job centers and other regional amenities. In addition, this helps to ensure that differences in permitting practices are based on similar geographic considerations.

Finally, similar to the geographic proximity criterion, that the selected towns shared similar access to regional transportation options was deemed important. This further ensures that access to employment, a major driver of housing demand, is relatively similar across the towns.

With these criteria in mind, I set out to select three similar towns with varying levels of Missing Middle permitting. I began by focusing first on the few communities with high rates of 2-4 unit permitting. According to the Census Building Permit Survey data, in only 10 communities did units in 2-4 unit structures account for more than 15% of all permitted units from 2010-2015. These communities included the Inner Core cities of Medford, Revere, and Malden, the Regional urban Center of Framingham, and the Developing Suburbs of Franklin, Rockland, Millis, Wenham, and Cohasset¹. The only maturing suburb in this group of Missing Middle permitters was the town of Ashland, with 16.2% of its units being permitted in 2-4 unit structures. Upon a review of the communities in the immediate vicinity of Ashland, I was able to select two other towns that fit my selection criteria: Natick at 3.3% and Wellesley at 0%.

These three towns are all Maturing Suburbs located in the MetroWest suburban region. They are within 10 miles of one another, surround the Regional Urban Center of Framingham, and are roughly

¹ Interestingly, many of the communities that permitted a high rate of units in 2-4 unit structures were indeed in Developing Suburbs, seemingly contradicting the previous claim that Maturing Suburbs would likely be the best fit for these home types. While these high rates were often due to the complete lack of permitting for units in 5+ unit structures in Developing Suburbs, the willingness of these towns to permit potential Missing Middle units would be an interesting course of additional study.

equidistant from the employment centers of Boston and Worcester. They are all located along the Interstate 90 corridor and all have stops on the Framingham/Worcester commuter rail line operated by the Massachusetts Bay Transportation Authority (MBTA). The following section dives further into descriptions of the three towns, highlighting their similarities and their differences.

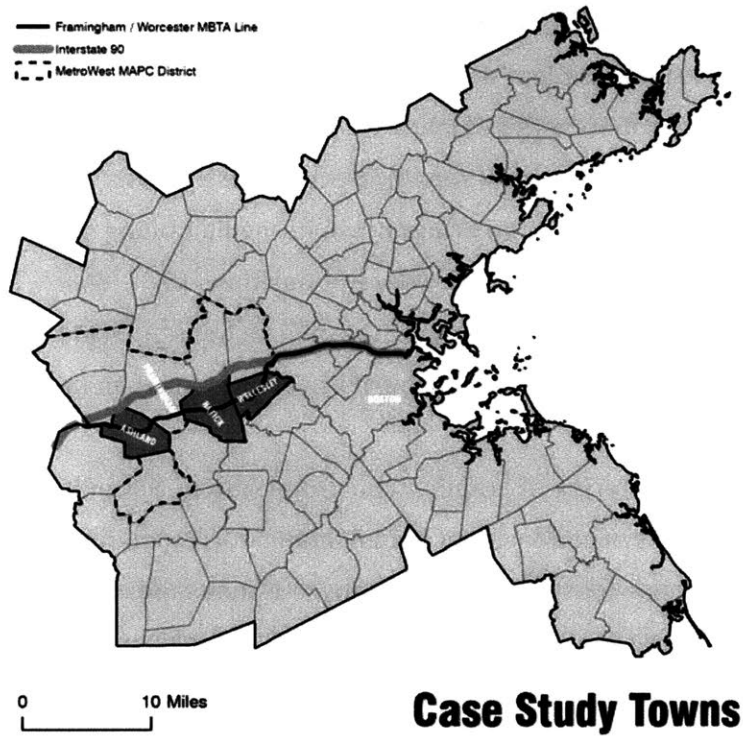


Figure 4.1: Case Study Towns

Case Study Towns: Selection Summary

<i>Community Data</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
Community Type	Maturing Suburb	Maturing Suburb	Maturing Suburb
Town Meeting Type	Open	Representative	Representative
<i>Distance Data</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
Distance to Boston			
Absolute	21.7 mi	15.7 mi	12.6 mi
via I-90	28.8 mi	23.5 mi	16.9 mi
Distance to Framingham			
Absolute	2.8 mi	3.4 mi	6.5 mi
by Road	3.4 mi	4.2 mi	8.1 mi
Distance to Worcester			
Absolute	17.3 mi	23.2 mi	26.2 mi
by Road	27.4 mi	32.6 mi	34.7 mi

Figure 4.2: Case Study Town Selection Summary

Town Summaries

While Ashland, Natick, and Wellesley were selected for their similarities, they exhibit some notable differences. Of the three, Natick is the largest, both in terms of population (34,892) and land area (16.0 square miles). Wellesley, with a population of 28,832 is not far behind, but its considerably smaller area of 10.5 sq. mi. makes it a denser community than Natick is overall. Ashland, on the other hand, is considerably smaller and less dense than either Natick or Wellesley, with a population of 17,159 spread across 12.9 square miles of land.

In terms of demographic composition, however, these towns are fairly similar. Though Wellesley's larger proportion of children brings down its median, along metrics of race and ethnicity, the towns are nearly identical, with largely white populations (82 - 86%). The towns do differ in terms of income, with Ashland and Natick reporting median household incomes of around \$100,000 and Wellesley, one of the wealthier Boston suburbs, boasting a median household income of nearly \$185,000.

The towns also differ in terms of employment composition. Not only do Natick and Wellesley have far higher overall levels of employment than Ashland, corresponding to their larger population, they also have higher jobs/residents ratios. Natick boasts 23,076 jobs and an employment/populations ratio of 0.66. Wellesley has 17,542 jobs and a ratio of 0.61. Ashland has only 4,637 jobs, or 0.27 jobs for every resident. This illustrates Ashland's comparably more "bedroom community" feel than its MetroWest neighbors. What's more, Ashland's workers, on average, make less per week (\$906) than their counterparts in Natick (\$1178) or Wellesley (\$1559).

Case Study Towns: Demographic Summary

<u>Population</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Population	17,159	34,892	28,832
Pop., Growth ('10-'15)	3.4%	5.7%	3.0%
Land Area (sq mi)	12.9	16.0	10.5
Population Density (persons / sq mi)	1332.9	2183.7	2745.7
Median Age	41.4	40.5	36.2
% under 18	23.9	24.7	27
% 65 or over	12.5	14.4	13.9
% White	86.2	85.8	82.8
% Black	2.8	1.5	2.1
% Asian	8.4	10.2	11.1
% Other	1.1	1.0	0.8
% Hispanic/Latino (any race)	4.6	3.7	4.4

<u>Households</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Households	6596	13,986	8561
Avg. Household Size	2.59	2.47	2.85
% Family Households	72.0	63.5	76.7
Avg. Family Size	3.08	3.17	3.33

<u>Income & Tenure</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
% Owner-Occupied	79.8	71.9	83.1
Median HH Income	\$102,911	\$100,469	\$163,454
Median HH Income: Owner-Occupied	\$119,556	\$121,565	\$184,489
Median HH Income: Renter-Occupied	\$60,833	\$54,088	\$77,463

Figure 4.3: Case Study Towns Demographic Summary
Data from U.S. Census Bureau 2015 American Community Survey

Case Study Towns: Employment Summary

<u>Employment</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Employment	4637	23,076	17,542
Total Firms	439	1485	1494
Average Firm Size (# employees)	10.6	15.5	11.7
Employment/Population Ratio	0.27	0.66	0.61

<u>Wages</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Wages	\$218 M	\$1.414 B	\$1.422 B
Avg. Weekly Wage	\$906	\$1178	\$1559

Figure 4.4: Case Study Towns Employment Summary
Data from Massachusetts Executive Office of Labor and Workforce Development

Clearly, these statistics show that any claims regarding the pure substitutability of these towns would be spurious. Still, their similar geographic locations, access to transportation infrastructure, proximity to job centers, and community type classification by a regional planning authority make them logical points of comparison for this research.

Housing Data

Existing Housing

As seen in the table below, which displays data from the 2015 American Community Survey, these towns reflect regional housing trends with some interesting exceptions. While single-family detached homes are certainly the dominant housing type in each town, this proportion ranges from 58.9% in Ashland to 82.5% in Wellesley, following the regional trend of wealthier communities containing more single-family housing. Indeed, Wellesley's housing stock is considerably more valuable than that of either Natick or Ashland, with a median home value of \$936,900, compared to just \$447,100 in Natick and \$361,400 in Ashland. While home values reported via the ACS are often inaccurate, these values were cross-checked with the median sale prices as reported by Zillow, which illustrated similar intra-town variations.

Missing Middle units, as well, range wildly, with 36.3% of Ashland's housing falling in the single-family attached or 2-9 unit range, 21.9% of Natick's housing doing the same, and only 9.3% of Wellesley's units comprising this type. Ashland's high rate of Missing Middle housing types are due largely to high percentages of single-family attached and 3-4 unit structures. Though this may at first give the appearance of a more storied history with Missing Middle types in Ashland. However, the age of structures in the three towns tell a different story. 14.6% of Ashland's units were built in 2000 or later, compared to only 9.2% in Natick and 9.9% in Wellesley. When looking at buildings constructed in 1990 or later, the disparity increases with 32.9% in Ashland, 15.6% in Natick, and 13.7% in Wellesley. In fact, a full 54.7% of Ashland's units were built since 1980, compared to 29.6% in Natick and 18.3% in Wellesley. As will be seen in the next section, this recent construction is largely the cause of Ashland's larger proportions of Missing Middle housing.

Case Study Towns: Existing Housing Data

<i>Housing Data</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
Total Units	6744	14,407	9067
Vacancy Rate	2.2%	2.9%	5.6%
Total Households	6596	13,986	8561
Median Home Value	\$361,400	\$447,100	\$936,900
2017 Median Sale Price ¹	\$424,990	\$595,000	\$1,232,200

<i>Units in Structure</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
% 1 Unit Detached	58.9%	61.1%	82.5%
% 1 Unit Attached	17.0%	4.9%	2.4%
% 2 Units	3.4%	6.4%	1.2%
% 3-4 Units	11.7%	4.4%	3.1%
% 5-9 Units	4.2%	6.2%	2.6%
% 10 - 19 Units	0.6%	7.3%	1.3%
% 20+ Units	4.2%	9.9%	6.8%
% Other	0%	0.1%	0%

<i>Housing Type</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
% Single-Family (1 Unit Detached)	58.9%	61.1%	82.5%
% Missing Middle (1-att, 2-9 Units)	36.3%	21.9%	9.3%
% Large Multifamily (10+ Units)	4.8%	17.2%	8.1%

<i>Year Built</i>	<i>Ashland</i>	<i>Natick</i>	<i>Wellesley</i>
2010-2014	1.1%	1.9%	2.2%
2000-2009	13.5%	7.3%	7.7%
1990-1999	18.3%	6.4%	3.8%
1980-1989	21.6%	14.0%	4.6%
1970-1979	10.7%	8.8%	6.8%
1960-1969	8.6%	8.1%	9.2%
1950-1959	14.9%	20.9%	16.4%
1940-1949	1.6%	10.5%	12.7%
Before 1940	9.7%	22.0%	37.6%

Figure 4.5: Case Study Towns Existing Housing Data
Data from U.S. Census Bureau 2015 American Community Survey

Housing Permits

As stated earlier, these towns were selected because, while similar in community type and geographic location, they had permitted very different shares of Missing Middle units in the recent past. The table below illustrates these differences. From 2010 to 2015, Natick permitted far more units (940) than either Wellesley (524) or Ashland (197). Over 75% of these units were located in structures with 5 or more units, while 21.4% were in single-family homes, and only 3.3% were in 2-4 unit structures. Wellesley saw a much larger percentage of its recently permitted units fall in the

single-family range, approaching 74%, while 23.3% of units were in 5+ unit structures, and none were permitted in 2-4 unit structures. Ashland permitted the largest share of units in 2-4 unit structures, serving as a proxy for Missing Middle housing, clocking in at over 16% with 33% of units in 5+ unit structures and 50.8% in single-family homes.

These proportions have varied substantially through the years. While Ashland was marked by much more balance from 2010 to 2015 than multifamily-heavy Natick or single-family-heavy Wellesley, a much larger proportion of its units were permitted in single-family homes from 1990-2009, though Missing Middle Units have consistently been a large component of the town's permits during that period. Natick and Wellesley's units, on the other hand, were more marked by a strictly single-family lean from 1990-2009. Units in 5+ unit structures were much more prevalent in permits issued in all three towns from 1980-1989.

Case Study Towns: Housing Permits

<u>2010-2015</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Units	197	940	524
% 1 Unit	50.8%	21.4%	73.7%
% 2-4 Units	16.2%	3.3%	0%
% 5+ Units	33.0%	75.3%	23.3%
<u>2000-2009</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Units	749	594	609
% 1 Unit	71.2%	100%	86.9%
% 2-4 Units	27.2%	0%	0%
% 5+ Units	1.6%	0%	13.1%
<u>1990-1999</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Units	944	846	264
% 1 Unit	70.4%	90.7%	98.1%
% 2-4 Units	19.0%	0.2%	1.9%
% 5+ Units	10.6%	9.1%	0%
<u>1980-1989</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Units	2477	2121	339
% 1 Unit	30.0%	60.5%	74.3%
% 2-4 Units	11.1%	0%	0.6%
% 5+ Units	58.9%	39.5%	25.1%
<u>1980-2015</u>	<u>Ashland</u>	<u>Natick</u>	<u>Wellesley</u>
Total Units	4367	4501	1736
% 1 Unit	46.7%	63.2%	82.1%
% 2-4 Units	15.8%	0.7%	0.4%
% 5+ Units	37.5%	36.1%	17.5%

Figure 4.6: Case Study Towns Housing Permits
Data from U.S. Census Bureau Building Permits Survey

Typological Assessment

Photographs of Missing Middle housing examples in the three towns were taken to assess the types and characteristics currently present. These examples include both older units and recently constructed. Descriptions of the photographed units follow.

Ashland

Ashland's examples of Missing Middle housing include some side-by-side duplexes (Figures 4.7 and 4.8), skinny homes (Figure 4.9), and courtyard apartments (Figure 4.10). Some are located in older, more central parts of town, though the lack of pedestrian infrastructure and neighborhood amenities prevent particularly high levels of walkability. Still these units are often intermixed with other structure types on the same block or within the same neighborhood. In many cases, the units appear to be on the smaller side, though immediate measurement of this was not possible. Other units are arranged as cluster developments in more far-flung greenfield locations. While often set in pleasant landscaping, by the nature of their siting, they do not appear to contribute to the kinds of mixed, walkable urbanism advocated by Missing Middle proponents.



Figure 4.7: Ashland's housing: side-by-side duplexes



Figure 4.8: Ashland's housing: side-by-side duplex



Figure 4.9: Ashland's housing: skinny home



Figure 4.10: Ashland's housing: courtyard apartments

Many of the newly permitted units are found in a series of developments known as the Village of the Americas. This multi-phase project is scattered throughout the town, taking the form of tract-style communities of 15-150 structures, each containing four units (Figure 4.11). While these units indeed provide increased density, their spatial arrangement and physical properties do not evidence many of the preferred Missing Middle characteristics. Again, their greenfield locale and distance to retail and employment make any claims of walkability dubious. The perception of density of these structures is also questionable; while their architecture somewhat mimics that of a single family home, their large footprint size and four-sided layout would seem to make them difficult to intersperse in an otherwise single-family neighborhood (Figure 4.12). Clearly, this is not a concern at the moment considering their isolated siting. It is also questionable whether these units are able to create a sense of community. Despite the shared-wall setup of the fourplex and the close proximity between structures, there is little in the way of common space, with each unit boasting its own entrance – one on each corner of the structure, and the landscape between structures not conducive to outdoor gathering (Figure 4.13).



Figure 4.11: Ashland's housing: One phase of Village of the Americas



Figure 4.12: Ashland's housing: Fourplex condos in Village of the Americas



Figure 4.13: Ashland's housing: Open space between structures at Village of the Americas

Natick

Natick's examples of Missing Middle units are considerably more unique than Ashland's. Just as in Ashland, older structures tend to take the form of side-by-side duplexes (Figure 4.14). However, newer units occur in several different typologies including clustered duplexes (Figure 4.15), small multiplexes (Figure 4.16), and connected townhouses (Figure 4.17). These units are often interspersed with other housing types including single-family detached homes, low- and mid-rise apartment complexes, and adaptive reuse factory renovations.



Figure 4.14: Natick's housing: Side-by-side duplex



Figure 4.15: Natick's housing: Clustered duplexes



Figure 4.16: Natick's housing: Small multiplexes



Figure 4.17: Natick's housing: Connected townhouse

Many units are scattered throughout the Natick Center downtown area, developed as incremental infill in an area with ample amenities, rail access, and walkability. Many more are located in one of Natick's Housing Overlay Option Plan districts, a zoning by-law that allows higher density development in exchange for providing 10-15% of units at income-restricted affordable rates. Further, some units are located in larger multi-family developments. The Modera community is a Chapter 40R development located on a former industrial parcel a half mile north of Natick Center. While most of the community's units are located in a large, four-story multifamily structure (Figure 4.18), this building is tucked away in the interior of the site, leaving a series of townhouses as the outward-facing units of the development (Figure 4.19). This was undoubtedly an intentional design decision to allow this Missing Middle typology to blend with the adjacent single-family homes.



Figure 4.18: Natick's housing: Large multifamily at Modera development



Figure 4.19: Natick's housing: Street-facing townhouses at Modera development

Wellesley

Like Natick, Wellesley's examples of Missing Middle units are varied, ranging from courtyard apartments (Figure 4.20) to side-by-side duplexes (Figure 4.21) to small multiplexes with considerable articulation (Figure 4.21). Newer units attempt to mimic these types (Figure 4.22), but often result in over-scaled simulacra in the pursuit of maximizing unit sizes within a shared wall form (Figure 4.23), including two 4500 square foot units combining to create a single "duplex" a 9000 square foot "duplex" (Figure 4.24).

Due to Wellesley's considerably more restrictive zoning, these units are only possible within the town center area where duplexes are allowed by right or surrounding neighborhood retail centers where amenity-driven sale prices are able to compensate for the added costs of zoning relief applications. Again, while Missing Middle units are sometimes smaller than their detached counterparts, Wellesley's hot housing market and history of large homes driven by the town's considerable wealth makes large-unit examples just as prevalent.



Figure 4.20: Wellesley's housing: Courtyard apartments



Figure 4.21: Wellesley's housing: Side-by-side duplex



Figure 4.21: Wellesley's housing: Small multiplex



Figure 4.22: Wellesley's housing: Courtyard apartments under construction



Figure 4.23: Wellesley's housing: Two-unit townhouses



Figure 4.24: Wellesley's housing: 9000 square foot duplex

Conclusion

What generalizations can be made from these typological findings? First, it is clear that not all towns are creating the same kinds of units. Towns whose land is largely built out see Missing Middle development take one of two forms – one-off, parcel-by-parcel infill where shared-wall, ground-oriented structures attempt to replicate the scale of surrounding units, or larger developments that incorporate larger Missing Middle structures in an effort to revitalize underutilized industrial, commercial, or residential parcels. In towns where less build-out results in more opportunities for greenfield development, developers may choose to pursue the added density of Missing Middle types in a more conventional suburban subdivision layout.

Still, across all three towns, we see that though there is an appetite for small-footprint, shared-wall living, some limitations to this demand exist. For one, stacked arrangements are hard to come by in newer construction, indicating that ground-oriented living is overwhelmingly preferred. Second, many developments seem to limit the number of attached units to two, or otherwise design the structures such that no unit is “in the middle” or surrounded on two sides by other units – implying a preference among builders (and, presumably, the consumers they wish to reach) to share as few walls as possible. This trend is occasionally broken where new units are built in considerable proximity to neighborhood amenities or in overlay districts that incentivize density and require affordable units, indicating a need for municipal “nudging” if higher density than duplexes can achieve is desired.

Interviews

While statistically determining the various factors correlated with these permitting variations is out of the scope of this research, one goal of this research was to dive further into potential reasons why Missing Middle housing has struggled to find a foothold in recent suburban development. To accomplish this, I conducted semi-structured interviews with planners and developers in the region. By asking what these individuals thought about Missing Middle housing and the barriers to its development, these interviews allow for a better understanding of the mindset and beliefs of those working in the realm of housing and urban form in these communities.

Planners

I spoke with three town planners and one regional planner regarding the topic of the Missing Middle. The views of the town planners were largely similar, focusing on Missing Middle's potential to provide additional housing units in an urban form that is compatible with the existing community's character. These additional units could be welcomed by the community, these planners stated, as they may allow for incremental affordability and better access to town center amenities through density. They also tended to focus on neighborhood opposition to growth and density more generally as reasons for little development of these typologies, recognizing that zoning and land use regulations serve as a manifestation of neighborhood preferences.

The regional planner, on the other hand, was a bit more skeptical of Missing Middle's potential to dramatically improve either affordability or walkability in these communities due to its small scale. Further, her experience had led her to find that barriers to such development was more financially driven than due to regulation. A more detailed recount of these interviews follows.

Sheila Page, Town Planner, Ashland

Ms. Page identified housing affordability, especially for Ashland's aging residents, as a definite concern for the town (Page, 2017). Still, she recognizes her community is considerably more affordable than its neighbors, especially for the high level of public services the town provides. While Ms. Page believes community members are interested in Missing Middle housing types to potentially provide this affordability, particularly townhouses and cluster development, she points to recently permitted and construction multifamily structures as potential barriers to substantial zoning modifications to allow further small multifamily construction. While reasons for these allowances

were not given, Ms. Page did mention the gradual loss of commercial tax base in the town, indicating a potential desire to attract any kind of development in order to increase the property tax base.

Specifically, she discussed a 398-unit development currently under construction that has many town residents concerned about potential impacts to the town's traffic, schools, emergency services, and community character. She also mentioned a series of developments known as the Village of the Americas which have paradoxically provided Missing Middle units while simultaneously dissuading further development of this kind. The Village of the Americas is a multi-phase development created by Fafard Real Estate. The homes therein are set up as townhouses, with each unit occupying the corner of a 4-unit structure. These structures are arranged in very suburban formations, similar to tract homes in typical single-family subdivisions, accessed by cul-de-sacs and loop roads and not particularly integrated with surrounding neighborhoods. While these units indeed occupy less space than single-family homes, and their smaller unit sizes and shared wall configurations allow them to be sold for more affordable prices, their urban form and lack of proximity to town center amenities like shopping or transit fail to live up to the preferred traits of Missing Middle advocates. What's more because these units have been built so quickly and do not architecturally align with Ashland's existing homes, Ms. Page noted that residents who might otherwise be inclined to allow zoning changes to permit more dense development – and indeed, who had done just that to allow the zoning by-law amendments needed to permit the Village of the Americas – “feel burned” by these large developments and are unlikely to consider such amendments in the near future.

Indeed, Ms. Page believes resident preferences are the most prevalent barriers to new growth of Missing Middle units. Particularly, citizens' concerns about increasing traffic and a strain on public schools, emergency services, and other public services make the adoption of more liberal zoning codes politically difficult. In fact, she explained that the town had recently passed a sewer hookup moratorium in order to prevent new developments from overloading their critical infrastructure. Still, Ms. Page pointed out that Ashland's zoning does indeed allow for small multifamily development in several zoning districts, including those created specifically for the Village of the Americas, and the town's accessory dwelling unit ordinance does permit the creation of additional small units for relatives. Further development of this type, however, will be difficult due not only to concerns of community impact, but also due to the dwindling supply of undeveloped land. While Ashland's development has not been particularly dense, its large acreage of protected open space in the form of state park and forest land would force any new Missing Middle construction to take the form of redevelopment of existing single-family residential parcels – a step Ms. Page feels might be a difficult one for the town to take in its current political climate.

Jamie Errickson, Director of Community & Economic Development, Natick

Mr. Errickson also pointed towards a desire for additional housing choice in Natick (Errickson, 2017). Specifically, due to residents wishing to age in place, the smaller units and ability to create walkable communities of Missing Middle housing could be appealing to the town and its residents. Just like in Ashland, he mentioned residents' concerns regarding the impact additional housing development would have on the town's schools and public infrastructure, despite the fact that demographic data indicates that Natick's multifamily units tend to house fewer children and are more infrastructure efficient than their single-family counterparts.

Mr. Errickson indicated that some Missing Middle development in the town occurred through the conversion of older single-family homes to two-family condominiums in the zoning districts that allow such development – especially on parcels in the town center area where access to amenities and regional transit are made possible. He also pointed to a recent development permitted through the Chapter 40R process that increased density through a mix of forms, including attached townhomes. Just as in Ashland, Mr. Errickson highlighted the fact that larger multifamily developments, especially those pushed through by Chapter 40B, have made residents leery of new, denser housing. This wariness, combined with an inherently arduous zoning amendment process that involves a super majority at town meeting procedures, makes future development of this typology difficult. This is despite the fact that, in Mr. Errickson's view, market trends are making smaller units in more walkable contexts increasingly appealing, as reflected by the high sale prices for units in recently converted two-family structures.

Michael Zehner, Planning Director, Wellesley

Just as his more westerly counterparts reported, Mr. Zehner acknowledged an understanding in Wellesley that affordability for middle-income residents is needed in Wellesley (Zehner, 2017). This is an especially acute need in Wellesley, where home values are among the highest in the region. While he acknowledged the potential for Missing Middle units to bridge this gap, he pointed out that recent developments of this type – usually attached townhomes and two-family structures – have still sold for over \$1 million per unit due to high demand to live in Wellesley.

Also, while some Wellesley zoning districts do allow small multifamily development, these areas are confined to a few parcels surrounding the town center and one or two additional shopping districts. When asked whether it may make sense to expand those zones in the future, Mr. Zehner acknowledged that “Wellesley wouldn't be Wellesley if every single-family home turned into a duplex,” highlighting the importance of neighborhood character in the town.

Again, fiscal and infrastructural impacts, especially the potential burdening of the school system, are major concerns residents have regarding increasing housing through densification. This is in spite of a study performed during a recent comprehensive planning effort that determined that multifamily residents tend to have fewer children than families living in single-family homes, and the fact that Wellesley's school enrollment is actually shrinking. Still, resident concerns and recent controversial 40B developments have made the specter of additional housing density a political contentious issue.

Karina Milchman, Regional Planner and Housing Specialist, MAPC

Ms. Milchman, a planner at the Metropolitan Area Planning Council, had a somewhat different perspective than the town planners (Milchman, 2017). First, her experiences with housing development have largely been in Inner Core communities, though she has worked in MetroWest in the past. In the denser cities of the urban core, Ms. Milchman's experience has pointed to financial constraints as the most important barriers to Missing Middle development. That is, high land costs tend to push developers to build denser structures in order to spread the land costs over more units. In MetroWest communities, where densities are lower, Ms. Milchman highlights the fact that a lack of walkable contexts may make Missing Middle developments less palatable to consumers, and, by extension, developers. She points out that many small multifamily developments in these towns tend to undermine the goals of compact urban form and smart growth due to their siting in greenfield locations and lack of urban streetscapes.

In terms of impact, Ms. Milchman is also somewhat skeptical of Missing Middle housing's ability to increase land use efficiency. While she agrees that these housing forms can provide additional density in typologies that appeal to suburban sensibilities, she recognizes that any suggestion of densification in the suburbs can be a struggle. In her experience, these struggles are far more rewarding when they result in the even more efficient land uses of larger multifamily and mixed use developments. While this is certainly a reasonable suggestion for how planners should spend their efforts in promoting smart growth principles, that Ms. Milchman recognizes the difficulty in advocating for increased density in Boston's suburbs also indicates the heavy hand of restrictive land use regulations in preventing additional Missing Middle development.

Developers

While planners in the region pointed to citizen preferences as the major barrier to Missing Middle developments, area developers that were interviewed were more likely to touch on the manifestation

of these preferences in the form of land use regulations. Further, they spoke to the market considerations of these housing types and highlighted the nuances thereof.

Anonymous Developer #1

The first developer interviewed has had experience developing single-family attached homes in the MetroWest region (Anonymous Developer #1, 2017). While these units sell for less than similarly appointed detached homes, the careful design and siting of the structures, along with ample demand allow the developer to realize a reasonable return on investment. Most of this demand has, as suggested by planners in the region as well, come from aging Baby Boomers looking to downsize in order to age in place. Despite this demand, as illustrated by the ample returns on investment, the developer has still found that units will earn a premium if they are detached, even if the separation is small. This has led to the pursuit of more cluster development typologies in the region.

The developer pointed to zoning and development review as particularly onerous barriers to Missing Middle development in the suburbs. Specifically, while some towns allow small multifamily development by-right in certain zoning districts, most require developers to go through a special permit process. This is a lengthy and expensive procedure that deters many from entering the market. To work around these regulations, the developer noted that many working in the region will select to set up a condominium association, allowing them to develop multiple units on a single large parcel in exchange for privatizing roads, open spaces, and infrastructure. However, this, too, is costly and may be restricting the supply of Missing Middle typologies. Instead, in the developer's estimation, if by-right zoning was relaxed to allow more small multifamily development in Boston's suburbs, developers would certainly see the incentive to build these typologies. This is in spite of the high demand for large, luxury single-family homes as selling multiple attached units on a single parcel can often net a larger profit than selling a single, larger home, especially when the parcel is located within walking distance of the town center of other amenities.

Anonymous Developer #2

The second developer has had experience building small multifamily homes in the MetroWest area (Anonymous Developer #2). One specific project involved constructing three two-family homes, arranged as side-by-side attached condominiums, in Wellesley. Because this project exceeded the by-right zoning of two units per parcel, the developer went through a special permit process that took 11 months. That the developer was willing to go through with the project highlights the high demand for these units in Wellesley. Still, the developer implied that many others have been dissuaded from

pursuing this work due to the arduous efforts needed to overcome restrictive zoning, indicating that “they put you through the same process whether you’re doing 60 units or six units,” echoing the concerns of Missing Middle advocates in other parts of the country.

Therefore, the developer expressed a preference for developing larger multifamily housing, even in these suburban towns, due to the regulatory obstacles to building smaller multifamily and attached single family units. However, in areas of town where amenities are easily accessible, the developer acknowledged there is more than enough market demand to push for redevelopment of single family detached homes into Missing Middle type units. While the trend has currently been to replace smaller, older homes with larger luxury ones, the developer attributed this more to restrictive single-family zoning than to widespread preferences for larger homes. Or rather, the demand for housing in suburban Boston, especially in towns with high quality amenities and schools like Wellesley, makes Missing Middle units desirable enough to cover the costs of foregoing the sale of luxury single-family homes, but this development is made very difficult by existing zoning codes.

Anonymous Developer #3

A third developer was consulted regarding the development of Missing Middle units in the region more generally. This developer agreed that zoning was a major barrier to this housing in Boston’s suburbs across the region, recognizing zoning as a way for current residents to preserve their home values (Anonymous Developer #3, 3017). What’s more, while developers might see a financial incentive to push for zoning relief or even zoning reform, the developer stated it was often easier to simply get *something* done than to fight, indicating developers’ preference for surety and expediency in the development process.

The developer also commented on trends in demand, noting that consumers appeared willing to give up detached units, provided that attached units allowed for greater access to neighborhood amenities. The developer was responsible for the creation of a mixed housing community in the southern suburbs of Boston. Through this experience, the developer pointed to consumers’ preference for locating near the “village center” in the community – an area with a grocery store, restaurants, and some retail – even if that meant accepting smaller units or attached home styles. Further, this development served as proof of concept to the developer that consumers were also willing to accept a mix of housing types on a given block, provided the styling and scale of these mixed units were compatible – large single-family with small duplexes and small multiplexes with heavily articulated massings – as well as high quality design and landscaping.

In general, this developer was optimistic for the market potential of Missing Middle units in the region. Due to small household sizes in the area and ever-increasing demand for housing, along with the cultural draw to the region's suburbs and historic town settings, the developer indicated demand for Missing Middle units was likely currently artificially depressed due to restrictive zoning and overall opposition to growth and densification by existing residents of Boston's suburbs.

Town-Level Takeaways

In Chapter 2, I explored the promoted types and characteristics of the Missing Middle as well as the national statistics related to the national extent and decline of these units and set forth the barriers postulated by advocates. Having now looked into the conditions in three Boston suburbs through typological assessments and semi-structured interviews, I use this section to outline the types of Missing Middle units present in these three towns, the extent to which they align with the promoted characteristics, and whether the barriers to their development are the same as those noted in other regions.

Types

Across all three towns stacked typologies, like the stacked duplex, triple-decker, and fourplex are limited in scope. While this might initially indicate consistently lower land values in these towns, the actual driver of this fact may be more complicated. In Ashland and Natick, where land values are certainly lower than those in the stacked typology strongholds of Boston, Cambridge, and Somerville, this reasoning seems to hold. Indeed, a lack of historical density in these towns have made the vertical arrangement of units less prevalent. However, this is not the case in Wellesley, where land values are very high. Instead, Wellesley's high incomes indicate the ability for potential residents to pay for the preferred arrangement of detached or side-by-side units. What's more, that these preferences are codified in the dimensional limits of zoning regulations makes it difficult for developers to pursue stacked units even if a market for them existed – though to be clear, all developers interviewed pointed towards widespread consumer preferences for non-stacked units.

More specifically, all three towns exhibited older examples of side-by-side duplex structures, sometimes as individual buildings and other times as clustered developments of several structures – in a kind of larger-unit bungalow court arrangement. While the tenure of older units in these towns was not verified, discussions with planners and developers indicated that most new units of this form were sold as fee-simple condominiums – a setup made easier by ground-oriented unit types.

Courtyard apartments and small multiplexes exist in Natick and Wellesley, but are less prevalent in Ashland. This appears to be due to several reasons. For one, Natick's more established and mixed use town center area has resulted in larger commercial buildings which allow for larger residential buildings to match the surrounding scale. In Wellesley, however, it is the existence of larger luxury single-family homes and some history of courtyard apartments that make these typologies less out of place.

Again, while individually-built townhomes are a rarity in these suburbs, many units are set up as side-by-side developments of 2-10 units and marketed as "townhomes." Builders in the area point to the greater sale premium that can be earned when units are referred to as townhouses as opposed to duplexes. In Ashland, these units take the unique form of the four-unit structure with four-sided access.

Relatively recently built skinny homes appear in Ashland in a district with side-by-side duplexes and other small-lot homes. While such units are not prevalent in the other towns, Natick does have a strong history of small-lot single-family homes. However, Mr. Errickson pointed to the trend in the redevelopment of these small homes (800-1200 square feet) into larger single-family (2500-3500 square feet) or two-unit homes with 1500+ square foot units (Errickson, 2017).

Accessory dwelling units, whether attached or detached, were not witnessed in any of the towns, though this is not surprising due to the inherently clandestine nature of these units. Ms. Page pointed to an accessory unit by-law in Ashland that allows for the construction of accessory units provided the future tenants are relatives of the homeowner (Page, 2017).

In general, while older units are somewhat more diverse, newly permitted Missing Middle units in all three towns tend to be ground-oriented and the scale of these developments attempt to respond to their surrounding contexts, with the exception of the four-unit townhouses in Ashland which are isolated away from any other neighboring developments. Due to the limited available land in Wellesley, new units generally take the form of infill and occupy only one or two parcels. Densification overlays in Natick, on the other hand, have encouraged more larger developments in centrally-located areas. Finally, in Ashland, where more greenfield land was available, Missing Middle units have generally occurred in a more classic subdivision arrangement, separated by type.

Characteristics

The units in each town exhibited the advocated characteristics of Missing Middle housing to very different extents. Reviewing the units of these towns in the context of the promoted characteristics

of the Missing Middle can help planners and developers understand the kinds of attributes they should be incorporating into future work.

Small Building Footprints

Generally, new units did not exist in particularly small building footprints. In Wellesley, where new units were most likely to be nestled between existing single-family homes, the large sizes of these neighboring houses and the high demand for large units in the town in general have resulted in very large structures. While these units have some potential to meet the scale of their surroundings purely in terms of square footage, their low levels of articulation tend to make them stand out. Natick's newer Missing Middle units have tended to occur in larger developments on former industrial lots with 4-10 units. Though the vertical scale of these structures does not overpower their residential surroundings, the footprints themselves would have a hard time fitting on a standard single-family parcel. Ashland's Missing Middle, most commonly comprised of the four-unit Fafard townhome structures, are also considerably larger than the single-family homes in the area; however, their isolated siting means their scale is not truly a factor in terms of neighborhood context.

Lower Perceived Densities

Developers and planners in all three towns noted that Missing Middle unit types could be politically easier to construct than larger multifamily units due to their lower perceived densities. However, while Missing Middle advocates point to this attribute as a method of increasing housing mix within neighborhoods and even on a single block, the practice in these towns was to develop these kinds of units in more isolated settings. In Natick, Missing Middle units are most prevalent in densification overlay zones. While this could conceivably result in a mix of housing, examples I found were generally created as larger developments, with clearly higher densities than the untouched surrounding single-family homes. Similarly, in Ashland, newer Missing Middle units are separated into homogenous tract developments, removing the need to blend with smaller housing types. Wellesley's units, despite their larger sizes, actually blended the best with the surrounding single family development, both because of the large size of the single-family homes and because they tended to be built one parcel at a time.

Smaller Units

While unit sizes were not measured in any of the towns, planners and developers generally pointed to units in Missing Middle homes being slightly smaller than those of the surrounding single

family houses. However, this was not always the case, with some of Wellesley's townhouse units falling into the 4000+ square foot range. Still, developers mentioned downsizing seniors' preference for smaller units as a main driver of Missing Middle unit sizes.

Simple Construction

Construction methods were not deeply discussed or explored in this research. From cursory formal analysis, it appears that most newer Missing Middle units in these towns are wood-framed, following the claims of national advocates. One developer mentioned that logistical planning of unit construction allowed quick output, indicating that some of the structures are indeed simple to build; however, it was not verified whether this was inherent to the housing types themselves or merely the process created by the developer. Still, it appears that these types are not considerably more difficult to construct than their single-family counterparts.

Walkable Context

The quality of walkability surrounding Missing Middle units in the three towns vary greatly and does not appear to have much of a correlation with the unit types themselves, but is more heavily related to the siting of the units instead. In Wellesley, where recently permitted Missing Middle units only exist in the town center and retail-heavy areas, walkability is more prevalent. Similarly, Natick's recently permitted Missing Middle is located near the town center, though the greater prevalence of larger developments along busier thoroughfares without stellar pedestrian infrastructure make walkability difficult to achieve. Ashland's Missing Middle units are the least walkable, though according to Ms. Page, this is not a consideration for most residents of Ashland who do not expect or demand walkability (Page, 2017). Again, this indicates that while Missing Middle units do provide the added density that is an important component of walkability, actually creating walkable neighborhoods depends on connectivity, pedestrian infrastructure, and access to amenities in addition to the density of housing.

Fewer Off-Street Parking Spaces

Again, while parking spaces were not measured, the impact of Missing Middle on vehicular use was determined via the interviews recapped above. Planners and developers in these towns indicated that while the development of denser housing types, including Missing Middle units, permit some increased access via walkability, cars are a very necessary part of life in Boston's suburbs. In fact, as seen in many of the photos above, driveways and garage doors play an important role in the

layout and design of these units. What's more, where Missing Middle units are incorporated into larger developments, surface parking lots are needed to serve all units. Therefore, while structured parking is not necessary for Missing Middle units, the examples found in the three case study towns do not appear to require fewer parking spaces per unit than otherwise anticipated due to high demand from suburban auto commuters.

Creates Community

It was unclear from the methods used whether MetroWest's Missing Middle units succeeded at creating community at a higher rate than other unit types. In Wellesley, where such units are interspersed in existing neighborhoods, it would appear that the creation of community would be similar to that achieved by the surrounding single-family homes. In Natick, where units tend to be part of larger developments, it stands to reason that more social interaction occurs due purely to the larger number of people living in these developments. However, common spaces, especially outdoor common spaces, appeared to be lacking. This was also true in Ashland, where the four-unit townhome clusters were not laid out with any common outdoor spaces, making the creation of community difficult.

Marketable

Missing Middle units in all three towns do appear to be marketable. In Wellesley, where school quality and high end amenities have driven up home values, shared units at lower price points are very easy to sell. In Natick, housing values are not as high, but the town's location and pleasant town center make denser units easy to sell due to overall housing demand in the area. Similarly, though Ashland's land values are the lowest of the three towns, shared wall Missing Middle units see more than adequate demand due to the quality public schools and the overall location of the town.

This marketability is due to demand from different demographic groups across the three towns. In Wellesley and Natick, developers and planners point to downsizing seniors as a major source of demand. Some have lived in larger homes in the area and wish to find smaller units in order to age in place. Others move to town to be closer to their children and grandchildren. In Ashland, however, planners point to the influx of lower middle class minority households hoping to gain a foothold in a community with good schools and relatively affordable home prices as the primary market for Missing Middle units.

Barriers

Despite the difference in recent permitting of Missing Middle units across the towns, barriers to this form of development are rather consistent. Developers overwhelmingly pointed to restrictive zoning as the primary barrier to building Missing Middle units. They state that zoning that allows only single-family homes or otherwise restricts dwelling units per acre restrict their ability to build Missing Middle typologies. While national advocates have also pointed to other regulations such as dimensional limits and landscaping requirements, developers in these towns claimed those barriers were able to be overcome.

Planners consistently brought up neighborhood resistance to the Missing Middle. In Wellesley, Mr. Zehner indicated that while the community might be open to the development of some of these units, widespread allowance of duplexes or townhomes would not align with the values of existing residents (Zehner, 2017). Although Ashland's recent Missing Middle was allowed through a development agreement that required zoning adjustments approved by an open town meeting, Ms. Page felt these kinds of developments would not be welcome in the future due to residents feeling a bit overwhelmed by the built results of these agreements (Page, 2017). Interestingly, though drastic densification and affordability concerns are not major issues in Ashland, the developer of the Village of the Americas project was able to convince the town that added density was needed in order to preserve the town's ample existing open space. Natick possesses the most optimistic outlook in terms of neighborhood acceptance. As Mr. Errickson framed it, though Missing Middle typologies might not be welcome in the more solidly single-family zones, the town's wide extent of town center densification overlay districts and history of larger, industrial parcels in need of redevelopment make projects that can add housing in suburban-friendly forms would continue to be welcomed.

In all cases, it is clear that municipal action is needed to allow the development of Missing Middle housing. Wellesley's paucity of new units is not due to a limited demand, but instead to restrictive zoning and time-consuming special permit and appeals processes. Natick, on the other hand, has encouraged incremental densification through targeted housing overlay districts and the use of Chapter 40R to spur town center development. Still, the large parcels made available tend to result in larger developments, often undercutting many of the promoted characteristics of the Missing Middle while still providing small-scale density increases. Finally, Ashland's recent Missing Middle has almost entirely been built through development agreements in which residents traded increased allowable densities for open space preservation and additional property tax revenue. However, the results of these developments have only exhibited limited evidence of promoted characteristics and have also spurred apprehension and resentment of similar projects in the future.

Conclusion

Although the intent of this town-level study was to determine the cause for differences in levels of permitting of Missing Middle typologies in suburban Boston, the methods employed produced inconclusive results. While historical regional trends point to a strong correlation between community age, density, and centrality and Missing Middle housing, it is Ashland, the most distant and least dense of the towns studied, that has been permitting the most of these units. What's more, Ashland's low employment/population ratio, more rural urban form, and imposing open town meeting governance make its affinity for small multifamily development even more peculiar. Still, a desire for increasing the town's tax base and a recognition of the need to protect the town's open space resources has pushed Ashland to accept these kinds of units. However, due to the siting and design of these developments, more akin to greenfield tract communities than streetcar suburbs, Ashland's recent small multifamily developments do not seem to be living up to the aspirations of Missing Middle advocates.

Natick, on the other hand, may have been expected to permit more of these unit types due to its more urban form and slightly less restrictive zoning. However, recent densification efforts have trended towards larger multifamily and mixed use developments. Still, despite ongoing concerns of developmental impacts town-wide, recent planning and outreach efforts, combined with increasing demand for walkable living in the town, have created the potential for more Missing Middle developments in the future – provided by-right zoning can be amended to allow it in the areas where it is needed.

Perhaps the most expected permitting figures come from Wellesley, where an established history of single family detached development, soaring home values, and great schools conspire to make terms like density and housing stock increases very scary indeed. Therefore, Missing Middle units have not been widely developed, due mostly to extremely restrictive zoning. Larger multifamily, while even less appropriate for the town's character, is preferred both by citizens, who would rather see a large number of affordable units built at once in predictable locations than risk densification of residential neighborhoods, and developers, who see financial benefits to consolidating development efforts on fewer developments of more units.

Across these towns, neighborhood preferences make restrictive single-family zoning difficult to amend despite market pressure to do so. While developers would gladly build Missing Middle typologies in this area, especially in the parts of town that are within easy access of transit, shopping, and other amenities, they are often disincentivized from doing so by the prohibitive costs of special

permit applications and zoning appeals. Instead, when they do wish to pursue developments more dense than single-family detached homes, they tend to push for larger multifamily units to make more efficient use of their outreach efforts. What's more, though planners at both the town and regional level see the potential for Missing Middle housing to address affordability and walkability gaps in the suburbs, they often find that struggling with area homeowners over the benefits and drawbacks of such developments takes more energy than they are worth, and prefer to redirect these efforts to larger, more efficient, and more affordable developments. Therefore, while blueprints exist for amending local land use regulations to allow incrementally denser development in forms that are compatible with existing single-family homes in these towns, overcoming barriers to Missing Middle development, and ensuring its execution aligns with goals of affordability and walkability are no simple tasks.

Chapter 5

Conclusion

Through this research, I endeavored to better understand the concept of the Missing Middle, the extents of these housing types throughout Greater Boston, and the potential barriers to its development, particularly in the region's suburban towns. These small multifamily development typologies are seen by many as a way to incrementally increase density and affordability in the suburbs of growing U.S. metro regions by increasing housing stock in a form that is simultaneously compact and compatible with existing suburban developments. While Boston's suburbs exhibit many of the criteria for the potential for Missing Middle development – growing populations, mixed use town centers, a history of traditional small-scale density – these units are neither being developed or discussed explicitly in these communities. This thesis was conceived as a way of initiating that conversation.

In Chapter 2, I reviewed the various types of units that comprise the Missing Middle. I discussed the physical characteristics of these typologies and explored the connections between these characteristics and existing literature on urban design and housing development, parsing out the differences between attributes inherent to small multifamily units in general and those dependent on contextual design and siting considerations. I further reviewed the national trends that have led to a decline in the permitting of Missing Middle units nationwide, despite an increasing interest in multifamily development more generally. I next explored the shifts in demographics and consumer preference that point to an increased demand for exactly the kinds of housing units Missing Middle advocates promote, and looked into the potential barriers to the development of these units as set forth by their advocates.

In Chapter 3, I focused on the Greater Boston region and its relationship to Missing Middle housing typologies. By exploring regional demographic data, plans, projections, and regulations, I attempted to illustrate the landscape in which housing development and smart growth policies are created. I then reviewed Greater Boston's history of developing small multifamily and attached single family housing, indicating the potential for a renewed interest in these forms. I looked at Greater Boston's existing housing in order to understand where these typologies currently existed in the region and how to describe the towns in which they are present. I further explored the composition

of the households that reside in these units to understand their demographics. Finally, I reviewed the region's recent permitting history to better understand where these units have and have not been developed as of late.

In Chapter 4, I continued to concentrate geographically, selecting the three suburban Boston towns of Ashland, Natick, and Wellesley, each boasting varying proportions of recent Missing Middle permitting to explore the extents of and barriers to this development at a more fine-grained scale. I reviewed the towns' demographic and housing data to illustrate the connections between these datasets as they relate to Missing Middle typologies. Finally, I used semi-structured interviews to assess the understanding and beliefs of planners and developers in the region regarding Missing Middle development and the barriers to it.

In this final chapter, I draw from the previous three to illustrate several major themes that have been made clear by my research. It is my hope that these results can inform future policy regarding the development of Missing Middle housing at both the local and regional scales.

Themes and Takeaways

Structure Size Alone Does Not Define the Missing Middle

As denoted by both the claimed characteristics of the Missing Middle and the extant urban forms of the kinds of units promoted by its advocates, Missing Middle housing is about more than simply structures whose physical form falls in the range between single-family detached and large multifamily homes. Indeed, in order to achieve the noble goals of affordability, walkability, and improved social connections, Missing Middle housing must be designed and sited in such a way that it takes advantage of existing public infrastructure, promotes connected streetscapes, and provides access to public spaces and mixed use amenities. As seen in the 4-unit developments of Ashland, while demand for these housing types is able to overcome inadequate or incompatible designs, such execution can have a detrimental effect on the potential for new developments of this type.

Demand for Missing Middle Housing Is Unmet by Supply

Nationally, regionally, and at the local level, demographic changes and shifts in consumer preferences, particularly aging Baby Boomers wishing to downsize and Millennials hoping to combine the amenities of urban living with the open space of the suburbs, are driving an increasing demand for compact living environments outside of downtown districts. However, while large,

luxury condos and apartments have seen huge upticks in construction, and single-family detached homes continue to be built at high rates, the smaller unit, attached forms of the Missing Middle have been largely forgotten at all geographic scales.

Greater Boston Has a Strong History with the Missing Middle

During its development progression from small port settlement to sprawling metropolis, Greater Boston's history of town centers and small developer-driven working class housing solutions have imbued the area with a deep connection to Missing Middle housing types. However, the age of these units in the region shows that these typologies have largely fallen out of favor with the development community and their geographic concentration in the urban core indicates that they are largely unwelcome in more suburban locations. Still, due to the area's familiarity with these forms, there is potential for a re-adoption of these units throughout the region.

Regulation Is the Missing Middle's Biggest Barrier

Developers in the region consistently pointed to the difficulty of developing Missing Middle units due to onerous zoning regulations. In fact, while some towns have shown a willingness to allow these kinds of units, the process of applying for special permits or setting up condominium associations in order to appease town officials has proven extremely costly and dissuades many would-be developers. What's more, while local planners point more to general anti-growth sentiment in the community, leading to a general distrust of density, these neighborhood opinions, driven mostly by concerns about community character, school overburdening, and fiscal impacts, are indeed manifested within local zoning and land use regulations.

The Market for the Missing Middle Is Complicated

Even so, both developers and planners in the region point to the need for urban-like amenities in order to promote a market for denser, shared wall development. The general sentiment in the region is that suburban consumers are only willing to forego large, luxury homes on large lots if they receive increased access to employment or daily needs. In this way, a lack of more walkable urbanism – connected street networks, mixed-use districts, multi-modal infrastructure – can be said to be another barrier to the development of the Missing Middle. However, due to the extremely hot housing market in the region and the demand to live in towns with good public schools and services, there are examples of less centrally-located developments of this type that continue to sell. However, it is difficult to determine whether this implies a true preference for these housing types despite a lack of

walkability, or if desperate consumers are simply willing to settle for inconvenience in an era of restricted supply.

The Missing Middle Might Always Be Difficult to Develop

While certainly not a bold statement, this final theme may be the most important of this entire document. Though Greater Boston indeed has a long history of developing small multifamily and attached single-family housing, this trend occurred when transportation and building technology limitations conspired to necessitate dense housing typologies without the aid of high-rise construction. What's more, the region's geographic constraints and growing economy continue to increase land costs. Therefore, developers wishing to capitalize on these trends will almost certainly pursue denser developments to maximize land efficiency and return on investment. On the other end of the spectrum, distributed regional transportation networks make distant, single-family homes appealing to consumers, despite the costs of congestion. Further, once homeowners have made that investment in a suburban home, they are likely to fight to protect its value, including voting to restrict competing housing supply through zoning and land use regulations. Finally, planners, who must always balance the desires of the community with best practices in design and development, may decide that political capital is better spent pursuing larger, more impactful projects.

It remains to be seen whether demographic trends and preference shifts will be able to overturn decades of resistance to incremental densification in the suburbs. While larger projects will always provide greater efficiencies, both in terms of land use and developer profits, they will also likely be seen by suburban residents as detrimental to the character of the community, and tolerated on the grounds of achieving affordable housing requirements rather than celebrated for promoting compact development forms. Missing Middle housing instead, with its combination of suburban building envelopes and urban dwelling unit densities, could prove to be a logical tool for promoting smart growth and affordability in Greater Boston.

Further Research

While this research aimed to be comprehensive in its scope and coverage, it was of course not possible to cover all topic of interest related to the Missing Middle. First, the limited geographic scope of this research, driven by time and resource constraints, could certainly be expanded. The questions explored here could continue to be pursued Potential future research that either expands on the work in this thesis or explores other related topics is enumerated below

Type

Although Chapter 4 included a brief typological assessment of suburban Boston's Missing Middle units, a deeper dive into the typological and morphological attributes of Greater Boston's Missing Middle would be a useful piece of research. This would allow for a better understanding of such units in the region and could serve as inspiration for future architectural and development choices.

Similarly, a historical tracing of Missing Middle units in the region might benefit those hoping to construct more of these units in the future. Similar to the MIT thesis regarding the history of Boston's triple-deckers (Wegmann, 2006), a historical survey of Missing Middle units more generally might point to the more explicit reasons for its demise and its potential to return.

Characteristics

While all of the Missing Middle characteristics touted by advocates are worth a deeper look, several in particular appear ripe for research. First, a study of the perception of density in the context of the Missing Middle is certainly warranted. Do residents truly feel that small multi-family units are appropriate for single-family neighborhoods? If so, what specific components of a development contribute to or detract from this condition?

Additionally, while proponents claim Missing Middle units require fewer parking spaces, this thesis was not able to adequately explore this claim. How does vehicle use align with Missing Middle inhabitation? Are municipalities requiring fewer off-street parking spots for these kinds of units in anticipation of other modes of travel?

Walkability, perhaps the Missing Middle's most important claim, could also stand to be further reviewed. How well do Missing Middle units correlate with pedestrian infrastructure, connective street patterns, and access to neighborhood amenities? How do these relationships change across the region or when comparing older units to new? Moreover, do inhabitants of Missing Middle units actually walk more than their single-family neighbors?

Finally, the creation of community is likely Missing Middle advocates' most dubious claim. Do these units promote increased community building? If so, what physical attributes of the structures allow for this? How does this relate to the concept of mixed housing types?

Demand

Though demand for Missing Middle housing was inferred in this study from demographic trends and shifts in housing consumer demand more broadly, a pointed set of studies regarding Missing Middle units more specifically is needed. First, a simple survey of consumers could help indicate the potential market for these units and what attributes consumers are most excited about. Interviews with or surveys of real estate agents could highlight similar information.

More specifically, a target market analysis of Missing Middle housing in the region could be deployed to determine the demand in the area based on demographic trends – a more direct and expansive version of the methods employed in Chapter 3. Further, through a detailed review of existing unit types in a region, this methodology allows for a report of the supply in order to understand the unmet demand at present and in the future.

Finally, a study of sale prices and rents demanded by Missing Middle units in the region, in combination with a survey of unit, neighborhood, and town attributes could determine how a unit's occurrence in a Missing Middle structure affects its value to consumers. Are Missing Middle units demanded at high enough prices/rents to compete with the prices commanded by luxury units? Conversely, are they low enough to provide actual affordability in areas where they are constructed?

Barriers

While this research did set out to understand the barriers to Missing Middle development in Greater Boston, further research on this front is needed. First, while this thesis focused on Boston's suburbs, Missing Middle development in Inner Core communities is also stymied, though usually for different reasons. Here, high land values partnered with high housing demand make larger, denser structures more sought after by developers. A better understanding of these forces could help planners determine how to incentivize more human-scale development in the urban core.

Further, in both urban and suburban contexts, a more robust review of zoning codes and ordinances could be used to uncover the specific regulations that limit the development of the Missing Middle. What kinds of zoning districts exist in these communities and how does this correlate with the creation of Missing Middle housing? Where zoning amendments were approved to increase density, how were these changes passed?

In addition to local regulations, a study of the impact of state legislation, primarily Chapters 40B and 40R could help determine how state agencies could promote Missing Middle housing. Does the threat of 40B encourage more small-scale development, or have previous 40B projects halted the

patience for any densification? What kinds of housing forms take place under 40R and how do they align with the types and characteristics of the Missing Middle?

The most prevalent neighborhood barriers discussed in this research relate to the potential fiscal impacts of suburban densification. A careful look at how Missing Middle units impact school enrollment, traffic congestion, and other city services could go a long way to convincing residents of their potential, or could point for the need to rethink this concept in terms of local effect.

Finally, while the understanding of neighborhood reaction to Missing Middle units in this research was gleaned from second-hand accounts by planners and developers, a more straightforward approach that involved surveys of or interviews with existing community members would certainly create a deeper understanding of community concerns and resistance.

The Future of Greater Boston's Missing Middle

As illustrated in Chapter 3, regional demographic trends point to an increasing market for Missing Middle units in the region. An aging population and a tendency for multi-generational living provide the impetus for shared-wall development. Further, the unit, neighborhood, and resident characteristics of existing Missing Middle units indicate the potential for these typologies to fill a void in terms of income as well as form. What's more, due to growth and densification efforts in several of Boston's suburbs, the geographic potential of these units has never been greater in the region.

Still, limitations presented by zoning regulations that steer suburban development towards single family homes, market incentives that make larger multifamily units more attractive to developers, and tepid demand for certain kinds of shared structures will certainly shape the form of these developments. Successful units should be set up as ground-oriented, fee simple townhomes to allow the most flexibility for sale or rent. Further, they should be located in amenity-rich and walkable locations – though good school systems and a hot housing market do allow less centrally-located examples to prove profitable. Finally, units surrounding common open spaces or oriented with their shortest edges along street frontages tend to be the most successful at blending in with neighboring home types and finding resident support.

The lessons learned from this research indicate that while consumer preferences have tended towards detached single-family homes for decades and high land costs make larger multifamily projects more attractive to most developers, demand for the Missing Middle in Greater Boston does exist. Because densification will need to continue in the suburbs, the Missing Middle may be an appropriate typology to promote. It will be up to local and regional planners to determine whether

these projects provide ample smart growth benefits to encourage their development. Due to the political capital needed to add any growth to some of these towns, some may choose to focus their efforts on larger, more impactful developments. Still, due to the ability for Missing Middle units to blend with existing suburban developments and their greater appeal for homeowners, it is sensible to expect them to become a larger part of Greater Boston's housing portfolio once again.

References

- AARP. (2014). *What is livable? Community preferences of older adults* [PDF Document]. Retrieved from
- Abrahms, S. (2016, June). *5 questions for architect Daniel Parolek about 'missing middle housing'*. Retrieved from <http://www.aarp.org/livable-communities/housing/info-2016/missing-middle-housing-daniel-parolek.html>
- AIA Michigan. (2015, February 2). *Michigan 'missing middle' housing design competition calls on architects and designers to create new versions of American dream* [PDF Document]. Retrieved from <http://www.aiami.com/Resources/Documents/MIplace%20PRESS%20RELEASE.pdf>
- Anonymous Developer #1. (2017, April 26). Phone interview.
- Anonymous Developer #2. (2017, May 1). Phone interview.
- Badger, E., & Ingraham, C. (2015, September 21). The most popular type of home in every major American city, charted. *The Washington Post*. Retrieved from https://www.washingtonpost.com/news/wonk/wp/2015/09/21/the-most-popular-type-of-home-in-every-major-american-city-charted/?utm_term=.21311fee37ce
- Barron, D. J., Frug, G. E., & Su, R. T. (2004). *Dispelling the myth of home rule: Local power in Greater Boston* [PDF Document]. Retrieved from https://www.mma.org/sites/default/files/resources/dispelling_myth_home_rule_06_0.pdf
- Ben-Joseph, E. (2005). *The code of the city: Standards and the hidden language of place making*. Cambridge, MA : MIT Press.
- Bilis, M. (2016, August 10). The anatomy of a three-decker. *Boston Magazine*. Retrieved from <http://www.bostonmagazine.com/property/blog/2016/08/10/three-decker-anatomy/>
- Bluestone, B. et al. (2016). *The Greater Boston housing report card 2016: The trouble with growth: How unbalanced economic expansion affects housing* [PDF Document]. Retrieved from <http://www.tbf.org/blog/2016/november/2016-greater-boston-housing-report-card>
- Bramley, G., & Power, S. (2009). Urban form and social sustainability: the role of density and housing type. *Environment and Planning B: Planning and Design*, 36(1), pp. 30-48. doi: 10.1068/b33129
- Broberg, B. (2016, May 18). *Missing middle housing*. Retrieved from <https://www.nar.realtor/articles/missing-middle-housing?random=1246410865>
- Brownstone, D., & Golob, T. F. (2009). The impact of residential density on vehicle usage and energy consumption. *Journal of Urban Economics* 65(1), pp. 91-98. doi: <https://doi.org/10.1016/j.jue.2008.09.002>

- Building Online. (2013, March 28). *Home buyer age impacts home size preference according to NAHB survey*. Retrieved from <http://www.buildingonline.com/apps/news/article/12139>
- Bureau of Planning and Sustainability. (2016, May). *Middle housing in Portland* [PDF document]. Retrieved from <https://www.portlandoregon.gov/bps/article/577850>
- Citizens' Housing and Planning Association. (2014, January). *Chapter 40B: The state's affordable housing law* [PDF Document]. Retrieved from <http://www.chapa.org/sites/default/files/40%20B%20fact%20sheet.pdf>
- Clark, P. (2017, March 30). *America needs small apartment buildings. Nobody builds them*. Retrieved from <https://www.bloomberg.com/news/articles/2017-03-30/america-needs-small-apartment-buildings-nobody-builds-them>
- Congress for the New Urbanism. *Missing middle housing*. Retrieved from <https://www.cnu.org/our-projects/missing-middle-housing>
- Density Atlas. (2011). *Introduction to Measuring Density*. Retrieved from <http://densityatlas.org/measuring/>
- Demand Institute. (2014a, September 16). *Millennials and their homes: Still seeking the American dream* [PDF Document]. Retrieved from <http://demandinstitute.org/millennials-and-their-homes/>
- Demand Institute. (2014b, October 30). *Baby Boomers & their homes: On their own terms* [PDF Document]. Retrieved from <http://demandinstitute.org/baby-boomers-and-their-homes/>
- Downs, A. (2005). Local regulations and housing affordability. In E. Ben-Joseph & T. S. Szold (Eds.), *Regulating place: Standards and the shaping of urban America* (pp. 103-112). New York, NY: Routledge.
- Dunham-Jones, E., & Williamson, J. (2009). *Retrofitting suburbia: Urban design solutions for redesigning suburbs*. Hoboken, NJ: John Wiley & Sons, Inc.
- Errickson, J. (2017, March 30). Phone interview.
- Fischel, W. A. (2001). *The homevoter hypothesis: How home-values influence local government taxation, school finance, and land-use policies*. Cambridge, MA: Harvard University Press.
- Fischel, W.A. (2015). *Zoning rules!: The economics of land use regulation*. Cambridge, MA: Lincoln Institute of Land Policy.
- Forsyth, A. (2003). *Measuring density: Working definitions for residential density and building intensity* [PDF Document]. Retrieved from http://www.corridordevelopment.org/pdfs/from_MDC_Website/db9.pdf
- Green, T. (2017, March 27). Phone interview.
- Hertz, D. (2015, December 8). *Between highrises and single-family homes*. Retrieved from <http://cityobservatory.org/between-highrises-and-single-family-homes/>

- HUD User (n.d.). *Portland, Oregon: Living smart program*. Retrieved from https://www.huduser.gov/portal/casestudies/study_101711_1.html
- Hurley, A. K. (2016, January 18). *Will U.S. cities design their way out of the affordable housing crisis?* Retrieved from <https://nextcity.org/features/view/cities-affordable-housing-design-solution-missing-middle>
- Isthmus Research (2013, March). *Learning from Vancouver: Gentle density* [PDF document]. Retrieved from https://blogisthmus.files.wordpress.com/2013/04/isthmus_gentledensity_sm.pdf
- Kasulis, K. (2016, April 20). *How vacancy rate points to an unaffordable housing market*. Retrieved from <http://www.northeastern.edu/rugglesmedia/2016/04/20/how-vacancy-rate-points-to-an-unaffordable-housing-market/>
- Keen, L. (2008, January 24). State OK's condo project under 40B. *The Boston Globe*. Retrieved from http://archive.boston.com/news/local/articles/2008/01/24/state_oks_condo_project_under_40b/
- Kolko, J. (2015, April 7). Why Millennials are less urban than you think. *FiveThirtyEight*. Retrieved from <https://fivethirtyeight.com/features/why-millennials-are-less-urban-than-you-think/>
- Kolko, J. (2017, March 23). American's shift to the suburbs sped up last year. *FiveThirtyEight*. Retrieved from <https://fivethirtyeight.com/features/americans-shift-to-the-suburbs-sped-up-last-year/>
- Lefferts, J. F. (2011, January 27). Work on 350-unit complex begins. *Boston.com*. Retrieved from http://archive.boston.com/news/local/massachusetts/articles/2011/01/27/work_on_350_unit_complex_begins/
- Lewyn, M. (2016, April 15). *The neighborhood veto and the 'missing middle'*. Retrieved from <https://www.planetizen.com/node/85659/neighborhood-veto-and-missing-middle>
- Levin, J. (2006). *Zoned out: Regulation, markets, and choices in transportation and metropolitan-land-use*. Washington, DC: RFF Press.
- Litman, T. (2016, March 23). *Where we want to be: Home location preferences and their implications for Smart Growth* [PDF Document]. Retrieved from <http://www.vtppi.org/sgcp.pdf>
- Lo, R. H. (2009). Walkability: what is it? *Journal of Urbanism: International research on placemaking and urban sustainability*, 2(2), pp. 145-166. doi: 10.1080/17549170903092867
- Mayblum, J. (2015, July 21). Town, neighbors formally respond to proposed Wellesley 40B project. *The Patriot Ledger*. Retrieved from <http://www.patriotledger.com/news/20160721/town-neighbors-formally-respond-to-proposed-wellesley-40b-project>
- McCormick, K. (2016, July). Gentle infill. *Land Lines*. Retrieved from <http://www.lincolninst.edu/publications/articles/gentle-infill>
- Metropolitan Area Planning Council. (2008). *MetroFuture: Making a greater Boston region* [PDF Document]. Retrieved from <http://www.mapc.org/metrofuture>

- Metropolitan Area Planning Council. (2008b). *Massachusetts Community Types* [PDF Document]. Retrieved from http://www.mapc.org/sites/default/files/Massachusetts_Community_Types_-_July_2008.pdf
- Milchman, K. (2017, March 24). In-person interview.
- Missing Middle. (2017). Retrieved from <http://missingmiddlehousing.com/>
- Morris, D. Z. (2016, March 28). Why Millennials are about to leave cities in droves. *Fortune*. Retrieved from <http://fortune.com/2016/03/28/millennials-leaving-cities/>
- Nelson, A. C. (2013). *Reshaping metropolitan America: Development trends and opportunities to 2030*. Washington, DC: Island Press.
- Obrinsky, M., & Stein, D. (2007). *Overcoming opposition to multifamily rental housing* [PDF Document]. Retrieved from <http://www.jchs.harvard.edu/research/publications/overcoming-opposition-multifamily-rental-housing>
- O'Connel, J. C. (2013). *The Hub's metropolis: Greater Boston's development from railroad suburb to smart growth*. Cambridge, MA: MIT Press.
- Opticos Design (2017). *Why is missing middle housing "missing?"*. Retrieved from <http://opticosdesign.com/missing-middle-housing-missing/>
- Page, S. (2017, April 10). Phone interview.
- Parolek, D. (2012, April 3). *Missing middle housing: Responding to demand for urban living*. Retrieved from <http://bettercities.net/news-opinion/blogs/dan-parolek/17698/missing-middle-housing-responding-demand-urban-living>
- Parolek, D. (2014, Winter). The Missing Middle. *Best in American Living*, pp. 9-12, Retrieved from http://www.nxtbook.com/nxtbooks/nahb/bal_2014winter_v2/index.php#/13/OnePage
- Parolek, D. (2016, December, 2). Email correspondence.
- Perin, L., & Grant, J. L. (2014). Perspectives on mixing housing types in the suburbs. *Town Planning Review*, 85(3), 363-385. doi:10.3828/tpr.2014.22
- Puget Sound Regional Council. (2015). *Transit-supportive densities and land uses* [PDF Document]. Retrieved from <https://www.psrc.org/sites/default/files/tsdluguidancepaper.pdf>
- Rapoport, A. (1975). Toward a redefinition of density. *Environment and Behavior* 7(2), 133-158. doi: <https://doi.org/10.1177/001391657500700202>
- Roth, P. (2017, April 3). Phone discussion.
- Saunders, P. (2016, April 30). *Cities and the "missing (housing) middle"*. Retrieved from <https://www.forbes.com/sites/petesaunder1/2016/04/30/cities-and-the-missing-housing-middle/#6f85668a3724>

- Siniavskaia, N. (2014, December 8). *What homes do Millennials buy?* Retrieved from <http://eyeonhousing.org/2014/12/what-homes-do-millennials-buy/>
- Smart Growth Online. (2016, May 6). *Missing middle housing: Responding to the demand for walkable living, May 25*. Retrieved from <http://smartgrowth.org/missing-middle-housing-responding-demand-walkable-living-may-25/>
- Smith, D. (2005, December 5). *One house, two house, row house, town house*. Retrieved from http://affordablehousinginstitute.org/blogs/us/2005/12/one_house_two_h.html
- Talen, E. (2012). *City rules: How regulations affect urban form*. Washington, DC: Island Press.
- Toderian, B. (2017, March 7). Canadian cities need more 'gentle density' to address housing crunch. *Toronto Metro*. Retrieved from <http://www.metronews.ca/news/toronto/2017/03/07/brent-toderian-gentle-density-housing.html>
- Tomko, J. (2015, May 16). *Missing middle: More choices and solutions to long term challenges* [PDF document]. Retrieved from https://www.austintexas.gov/sites/default/files/files/Imagine_Austin/Walk_The_Talk_-_Tomko2.pdf
- U.S. Census Bureau (2015). *Selected housing characteristics, 2011-2015 American Community Survey 5-year estimates*. Retrieved from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_5YR_DP04&prodType=table
- U.S. Census Bureau. (2016). *Characteristics of new housing completed*. Retrieved from <https://www.census.gov/construction/chars/>
- U.S. Census Bureau. (2017a). *Housing starts*. Retrieved from <https://fred.stlouisfed.org/series/HOUST1F#0>
- U.S. Census Bureau. (2017b). *New privately owned housing units authorized by building permits in permit-issuing places*. Retrieved from <https://www.census.gov/construction/bps/uspermits.html>
- U.S. Census Bureau. (2017c). *Quarterly residential vacancies and homeownership, fourth quarter 2016* [PDF Document]. Retrieved from <https://www.census.gov/housing/hvs/files/currenthvspress.pdf>
- U.S. Census Bureau. (n.d.a). *Building permits survey: How the data are collected*. Retrieved from https://www.census.gov/construction/bps/how_the_data_are_collected/
- Urban Land Institute. (2010). *Priced out: Persistence of the workforce housing gap in the Boston metro area*. Retrieved from http://uli.org/wp-content/uploads/2012/06/WH_Boston_091610_press.pdf
- Urban Land Institute. (2015). *Gen Y and housing: What they want and where they want it* [PDF Document]. Retrieved from <http://uli.org/wp-content/uploads/ULI-Documents/Gen-Y-and-Housing.pdf>

- Urban Land Institute. (2016, September). *Building for the middle: Housing Greater Boston's workforce* [PDF Document]. Retrieved from <http://boston.uli.org/building-for-the-middle/>.
- Verrilli, A., & Raitt, J. (2009, October). *The use of Chapter 40R in Massachusetts: As a tool for smart growth and affordable housing production* [PDF Document]. Retrieved from http://www.mapc.org/sites/default/files/Chapter_40R_Report.pdf
- Walker, A. (2016, April 29). Millennials will live in cities unlike anything we've ever seen before. *Gizmodo*. Retrieved from <http://gizmodo.com/millennials-will-live-in-cities-unlike-anything-weve-se-1716074100>
- Warner, S. B. (1962). *Streetcar suburbs: The process of growth in Boston, 1870-1900*. Cambridge, MA: Harvard University Press.
- Warner, S.B. (1999). A brief history of Boston. In A. Krieger & D. Cobb (Eds.), *Mapping Boston*. Cambridge, MA: The MIT Press.
- Wegmann, J. (2006). *What happened to the three-decker?* (Masters thesis). Massachusetts Institute of Technology, Cambridge, MA.
- Westcott, L. (2014, March 27). More Americans moving to cities, reversing the suburban exodus. *The Atlantic*. Retrieved from <https://www.theatlantic.com/national/archive/2014/03/more-americans-moving-to-cities-reversing-the-suburban-exodus/359714/>
- Wirth, S. (2013, April 25). *Goodbye, micro-apartments: 'low rise high density' presents an alternative housing solution*. Retrieved from <https://architizer.com/blog/low-rise-high-density-exhibition/#.UXmzBCtASZZ>
- Zehner, M. (2017, March 29). In-person interview.