

ABSTRACT

In communities of all sizes across the United States, multifamily residents have lower levels of access to recycling services than single-family residents (SPC, 2016). To address this challenge and widely promote the practice of recycling, many states and municipalities have enacted recycling mandates. This thesis aims to answer two main research questions: “How effective are existing municipal recycling mandates for providing access to recycling services to residents of multifamily properties?” and “How do different payment structures used to fund multifamily recycling services distribute costs amongst residents of single-family and multifamily properties? Is this cost distribution perceived as fair?” Two primary methods of data collection were used to answer these questions: first, the content of municipal recycling mandates for multifamily properties was analyzed using three standards (convenience, capacity, and compliance agency); second, a case study was conducted to describe and compare the payment structures used to fund multifamily recycling in two North Carolinian municipalities. The majority of municipal recycling mandates were proved to be ineffective by at least one of the three standards for measuring access to recycling services, and the case study confirmed that a payment structure was considered less fair if multifamily residents were required to pay the same amount as single-family residents and had less or no access to municipal recycling services.

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CHAPTER I. SIGNIFICANCE

Introduction

A recent study conducted by the Sustainable Packaging Coalition found that in communities of all sizes across the United States, multifamily residents have lower levels of access to recycling services than single-family residents (SPC, 2016). Where municipal recycling services are offered and technically available to multifamily residents, many barriers unique to multifamily properties prevent their residents from having a real opportunity to use such services. Multifamily properties, comprising 17.6% of the total U.S. housing stock with more than 20 million occupied housing units in the country (U.S. Census Bureau, 2016), pose a significant challenge to recycling programs and their waste reduction goals nationwide that is costly to ignore.

To address this challenge and widely promote the practice of recycling, many states and municipalities have enacted recycling mandates that effectively require recycling services to be made directly available to residents of multifamily properties. The effectiveness of these mandates is unclear; even in municipalities where recycling mandates exist, multifamily residents are still reported to have less access to recycling services than their counterparts that live in single-family residences. This discrepancy of access leads to an additional problem of cost distribution and fairness for multifamily residents. It is common for municipalities to fund their municipal recycling collection services by imposing a universal fee or tax on its constituents. This raises a fairness concern if multifamily residents are paying the same amount of money for recycling services as single-family residents, but consistently receive lower levels of access to those services across the country.

This thesis aims to answer two main research questions: “How effective are existing

municipal recycling mandates for providing access to recycling services to residents of multifamily properties?” and “How do different payment structures used to fund multifamily recycling services distribute costs amongst residents of single-family and multifamily properties? Is this cost distribution perceived as fair?” Two primary methods of data collection were used to answer these questions. First, the content of municipal recycling mandates for multifamily properties was analyzed using three standards for measuring access to recycling services: convenience, capacity, and compliance agent stipulations. Second, a case study was conducted to describe and compare the payment structures used to fund multifamily recycling in two North Carolinian municipalities and to determine the fairness of how their costs were distributed. The analysis of municipal recycling mandates found that the majority of municipal recycling mandates proved to be ineffective by at least one of the three standards for measuring access to recycling services—particularly capacity and convenience stipulations. The case study confirmed that a payment structure was considered to have a less fair cost distribution if multifamily residents were required to pay the same amount as single-family residents for lesser or no access to municipal recycling services.

Defining “Multifamily”

The term multifamily housing, residence, or property is used in this paper to describe a residential building with 5 or more separate housing units. The term “multifamily” is used interchangeably with “multiunit,” “multitenant,” and “multi-dwelling” by states and municipalities across the United States to refer to residential buildings with more than one housing unit. In policy, the number of separate housing units used to officially differentiate multifamily housing from single-family housing varies widely between 2 and 100 units; however, the most commonly used cutoff is 5 or more units. Apartment complexes and

condominiums, often overseen by a property manager, are some of the most common types of multifamily properties. Despite the fact that multifamily residential properties exist primarily to provide lodging for individuals, they are frequently classified as commercial properties and treated as such under the law. Because of this, such properties are typically ineligible to receive residential garbage and recycling collection services offered by a municipality to single-family homes. The majority of multifamily properties relies on permitted or franchised haulers to provide recycling service through an open market system.

Why Multifamily Recycling Matters

The practice of recycling is motivated by environmental and ethical reasons as well as economic incentives. In the United States, the benefits of recycling have been widely acknowledged by the general public and supported by government action since the early 1990's. The practice of recycling achieves environmental aims through two avenues: first by reducing waste sent to landfills where it will break down and release pollutants in the form of greenhouse gases and leachate; and second by reducing the amount of virgin resources that need to be extracted from the natural environment and utilized for human consumption (Hird, 2013). Even a marginal improvement in access to recycling services produces significant benefits; increasing multifamily residents' access to recycling services offers great potential for increasing capture rates, decreasing contamination levels, and reducing greenhouse gas emissions.

The motivation for achieving such environmental aims is strongly reinforced by common moral and religious obligations. Placing value on natural resources beyond their market price is supported by virtues of environmental stewardship and extended responsibility of common property. Pope Francis' encyclical *Laudato si'* highlights the relationship between environmental actions and moral principles with the statement: "Today, however, we have to realize that a true

ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear both the cry of the earth and the cry of the poor” (Catholic Church and McDonagh, 2016). Outside of a religious context, recycling is often perceived as an altruistic pro-social behavior since the costs of participation are private and the benefits are distributed across society (Thøgersen, 1996). While members of society have often advocated for recycling on moral grounds, most governmental agencies endorse the practice for its economic benefits.

The economic impacts of recycling municipal solid waste are numerous and widely experienced amongst the public and private sector. Recycling creates “green jobs” and workers’ wages at each of its collection, processing, and transportation stages. A recent report issued by the Institute of Scrap Recycling Industries (ISRI) found that the recycling industry provides employment for over 470,000 citizens in the United States (Dunham, 2017). In addition to creating employment opportunities for people, recycling services also create opportunities to generate revenue for state and local governments. In the state of Texas alone, municipal recycling produced \$194.3 million of revenue through recycling-related sales taxes, property taxes, and other taxes and fees (TCEQ, 2017). The Environmental Protection Agency’s Recycling Economic Information (REI) report emphasizes that recycling and reuse activities nationwide accounted for 757,000 jobs, generated \$36.6 billion in wages, and produced \$6.7 billion in tax revenues (EPA, 2016). The EPA’s statistics account for economic activity associated with the direct production of recycling as well as the upstream processes associated with recycling. While recycling typically increases the initial cost of waste management, its cumulative economic impacts are a net positive for society and the economy.

Stakeholders of Multifamily Recycling

The most directly involved stakeholders of multifamily recycling are the providers of recycling services to multifamily properties (typically either private waste haulers or public employees of a municipal recycling program), the residents of multifamily properties, and the property management or other designated party who is responsible for arranging and/or paying for recycling collection services at multifamily properties. The implementation of a successful recycling program at multifamily properties is uniquely complex compared to single-family properties because of the addition of property managers as a key stakeholder. Multifamily residents almost always forgo the ability to independently set-up or subscribe to recycling services for themselves whether it be through a municipal recycling program or a private collection service. This can be a source of frustration and even moral distress when residents feel that they are obligated to participate in recycling but lack the autonomy to ensure that they have the opportunity to do so (Jameton, 2013).

The benefits of increased access to recycling services at multifamily properties extend beyond property managers and their tenants to virtually all of society. All members of the general population are indirectly affected by the economic and environmental benefits of recycling services provided to multifamily properties. Depending on the payment structure used to fund multifamily recycling services, all of the constituents in a municipality may be directly responsible for helping to finance the costs of recycling collection at multifamily properties. Manufacturing industries and large corporations that view recyclables as a commodity or feedstock for their productions may have a vested interest in or even legal responsibility to improve the access to recycling services at multifamily properties as well. While governmental agencies are currently responsible for funding and administering municipal waste and recycling

services in most areas of the world, some models of extended producer responsibility (EPR) are gradually becoming more common. EPR legislation requires that manufacturers be held accountable for the environmental impacts of the full life-cycle of their products, and thus pins the responsibilities for funding and administering municipal waste and recycling services on the producers of disposable goods.

Objectives of Research

The ultimate goal of this research is twofold: first to assess the effectiveness of municipal recycling mandates for providing access to recycling services to multifamily residents, and second to explore the cost distribution and fairness of different payments structures used to fund multifamily recycling services. The effectiveness of municipal recycling mandates is measured using three standards: the convenience of recycling services available to residents of multifamily properties, the container capacity of recycling collection receptacles at multifamily properties, and who the designated agent is for compliance with the recycling mandate. Little to no research exists that has analyzed the appropriate level of convenience, capacity, and compliance agent stipulations that would best serve the needs of a successful multifamily recycling program. The fairness of multifamily recycling payment structures is then evaluated by comparing who pays for the provision of recycling services with who receives and/or benefits from the provision of the recycling services that are funded. An exploratory case study of Orange County and the City of Durham's multifamily recycling payment structure will illuminate two different approaches used to fund and provide recycling services to multifamily properties across the United States.

Organization of Paper

The second chapter provides an overview of the current literature on recycling services and multifamily recycling policy in the United States. A brief description of the history of

municipal solid waste policy and waste management regulation in the United States is provided alongside a summary of the current state of multifamily recycling policy in the United States. Existing literature is then referenced and synthesized to examine what circumstances are necessary for an individual to truly have “access” to recycling services. The literature review concludes by considering different payment structures used to fund recycling services for multifamily properties. Chapter 3 explains the methodology used to firstly analyze the effectiveness of municipal recycling mandates for providing residents of multifamily properties with access to recycling as well and secondly conduct an exploratory case study of the payment structures used to fund multifamily recycling in two North Carolinian municipalities and the fairness of their cost distributions. This chapter also discusses the limitations and generalizability of the research methods used. Chapter 4 presents a discussion of the research’s empirical findings and describes the major themes that illustrate the effectiveness of current multifamily recycling mandates in the United States as well as the fairness of their affiliated recycling fees and payment structures for residents of multifamily properties. Chapter 5 concludes by discussing the implications of the research findings and provides recommendations for future research and policy design to improve the level of access to recycling services experienced by residents of multifamily properties across the United States.

CHAPTER II. LITERATURE REVIEW

This chapter provides the following background information: an overarching definition of access to recycling services; a summary of the availability of recycling services in the United States; an overview of the regulatory landscape of MSW recycling in the United States, an explanation for using convenience, capacity, and compliance agent standards to measure access to recycling services for residents of multifamily properties; and a consideration of the different payment structures used to finance municipal recycling services and their cost distribution. Previous research has calculated the availability of recycling services and the implementation of municipal recycling mandates across the United States. This thesis fills a knowledge gap conducting the first study of its kind to assess the effectiveness of municipal recycling mandates as a mechanism for increasing multifamily residents' access to recycling services and the fairness of different payment structures used to fund multifamily recycling services. The information provided in this chapter lays the groundwork for the discussion of the research methodology in the third chapter.

Definition of “Access” to Recycling Services

Two necessary conditions must be met for a recycling program to be successful: 1) widespread residential access to recycling services and 2) high participation levels in residential recycling programs. Merriam-Webster Online defines access as the “freedom or ability to obtain or make use of something” (n.d.). A resident who has access to recycling services does not necessarily participate in the practice of recycling, but is ensured to have the opportunity to do so if they choose. Having access to recycling is a necessary precursor for increasing recycling rates; a resident without access to recycling services is physically unable to participate in recycling regardless of how much they might wish to be engaged. This study focuses exclusively on

measuring levels of access to recycling service, not rates of participation in recycling programs.

Differentiating Between “Access” and “Availability” of Recycling Services

While the terms “accessible” and “available” can be used synonymously in most settings, this thesis uses the two to differentiate between recycling services that offer merely a formal opportunity to recycle and recycling services that offer an effective, real opportunity to recycle. Where recycling collection services are present and legally compliant with municipal recycling mandates, even in minimalistic fashion, they are considered to be “available” to multifamily residents. The term “accessible” is reserved to describe recycling services that are deemed reasonably usable according to standards for convenience, capacity, and compliance agent designation. These standards are supported by the existing body of literature on recycling and are discussed in further detail later on in the chapter.

Availability of Recycling Services in the United States

In its “2015-16 Centralized Study on Availability of Plastic Recycling,” the Sustainable Packaging Coalition (SPC) offers the most recent data on where residential curbside and drop-off recycling programs are available in the United States. Table 1 presents the study’s findings on the availability of curbside and drop-off recycling programs in different sizes of communities across the United States. For single-family residents, the SPC defines curbside recycling as recycling collection that residents can participate in by setting out their materials, typically in a bin or cart, on the side of the street adjacent to their homes. For multifamily residents, curbside recycling means that residents can participate in recycling by bringing their recyclables to a collection container that is located anywhere on the complex. Drop-off recycling collection, both for single-family and multifamily residents, is defined as participants bringing recyclables to “a collection point away from their residence” (SPC, 2016, p.7). Because of its close proximity and

increased convenience, curbside recycling collection is almost always preferable over drop-off recycling collection.

TABLE 1. AVAILABILITY OF RECYCLING PROGRAMS BY COMMUNITY SIZE/TYPE

PERCENT OF COMMUNITIES SURVEYED WITH PROGRAMS AVAILABLE BY COMMUNITY SIZE & TYPE	SINGLE FAMILY CURBSIDE	MULTI FAMILY CURBSIDE	DROP OFF
Largest (Population 250,000+)	100%	71%	70%
Incorporated	100%	73%	69%
Unincorporated	100%	60%	80%
Large (Population 125,000-250,000)	88%	46%	66%
Incorporated	96%	48%	61%
Unincorporated	66%	39%	82%
Medium (Population 50,000-125,000)	83%	36%	70%
Incorporated	94%	42%	64%
Unincorporated	59%	23%	83%
Small (Population under 50,000)	65%	28%	59%
Incorporated	73%	33%	58%
Unincorporated	32%	10%	62%

SOURCE: SUSTAINABLE PACKAGING COALITION, 2016.

The disparity between the percentage of single-family residents and multifamily residents who have curbside-recycling available to them ranges between as much as 47% in medium-sized communities and as little as 29% in the largest communities. The statistics reported in Table 1 may actually overstate the percentage of multifamily residents who truly have the opportunity to participate in curbside recycling collection. The SPC specified that “Residents were considered to have *curbside recycling programs* available when the curbside recycling service is provided automatically or the resident or property owner has the ability to opt-in to receive the service”

(SPC, 2016, p.10). This definition more accurately describes a situation in which curbside recycling is available to property managers—not the multifamily resident who is subject to their property manager’s decision to offer such collection at their complex.

Quality of Recycling Services Available to Multifamily Residents

The SPC categorizes municipal recycling services for multifamily and single-family residents into three types of collection systems: automatic, opt-in, and subscription. In automatic programs, all residents are provided municipal recycling services as a matter of course. These services can be provided directly through the municipality using public employees or provided by a private contractor. Opt-in recycling programs offer municipal recycling services to all residents but require that they sign up to receive service and, in some cases, pay an additional fee to participate. A subscription service leaves all responsibility to a resident to hire a curbside recycling service of their choice from the private market (SPC, 2016, p.7). Automatic recycling collection is widely considered to provide the highest quality of service and garner the highest levels of participation. Opt-in collection services are considered to provide the second-best quality of service and opportunity to participate, and subscription collection services are ranked least favorably for doing so. It ought to be noted that automatic recycling collection is rarely provided to residents of multifamily properties. In many instances, where municipal recycling services are offered automatically or on an opt-in basis to all single-family residents, multifamily residents are altogether excluded from receiving any municipal recycling service on the basis that they belong to a commercial and not residential entity.

By providing updated, comparative statistics on the differing levels of availability to recycling services experienced across the country, the SPC’s findings prove that quality of recycling services available to residents varies greatly across different regions and is especially

poor for residents of multifamily properties. Single-family residents and multifamily residents seldom experience the same availability of recycling programs; approximately one-fifth of residents in the United States live in a community with a standardized recycling program for both single-family and multifamily homes (SPC, 2016, p.24). One of the key findings of the SPC's study was that despite 94% of residents nationwide having some form of recycling services available to them, only 53% of residents were found to have curbside recycling collection provided to their home automatically. Relying on anecdotal claims, the Sustainable Packaging Coalition explained this measured disparity as a result of multifamily complexes being less likely to receive automatic recycling services as well as being subject to their property manager's decision to subscribe for service where services are offered on an opt-in basis (SPC, 2016, p.24).

In order to increase the overall availability of recycling services and reduce the discrepancy observed between single-family and multifamily residents, several state and municipal governments have enacted recycling mandates for multifamily properties. Before providing an overview of the current regulatory landscape of multifamily recycling in the United States, the following section provides a concise history of national MSW legislation in the United States. This history is necessary to better understand the current role of states and municipalities for regulating recycling as well as the different policy mechanisms that are used.

Regulatory Landscape of Multifamily Recycling in the United States

A Brief History of National MSW Legislation in the United States

With the exception of wartime recycling efforts, MSW management in the United States was considered a local issue that fell outside the purview of the federal government until the early 1960s. The shift in regulatory responsibility can be largely attributed to the rapid expansion

of the size and composition of the MSW stream throughout the 20th century. Due to the booming population and rising popularity of paper and plastic packaging, society began generating greater quantities of waste than ever before. The waste stream grew not only in quantity, but also in the variety of materials it contained; paper, plastic, toxic chemicals, and synthetic materials became progressively more common in the households and waste bins of American citizens. While the waste stream itself evolved, the methods for its disposal did not. Many citizens and localities continued to practice open-burning of MSW, consequently emitting noxious fumes into the atmosphere and threatening the health of humans and their natural environments (Louis, 2004, p. 315). Solid waste management slowly made its way onto the national political agenda as the risks of improper waste disposal became increasingly perceptible to the public.

The Solid Waste Disposal Act (SWDA) of 1965 was the federal government's first endeavor to develop sound waste management practices across the country. The Public Health Service (Department of Health, Education, and Welfare) and the Bureau of Mines (Department of the Interior) jointly administered the SWDA until 1970 when the EPA was established and assumed full responsibility for the Act's implementation (Hunsaker-Clark, 2012). One of the primary objectives of the SWDA (as cited in Louis, 2004) was to "initiate and accelerate a national research programme to develop these [solid waste management and resource recovery] systems and provide guidelines and training for their effective implementation" (Government Printing Office, 1966). This research, funded by the federal government, uncovered a national need for a more comprehensive approach to MSW management and advanced regulation of disposal practices—prompting major amendments to the SWDA (Hunsaker-Clark, 2012).

The most influential amendment was enacted in 1976 when Congress passed the Resource Conservation and Recovery Act (RCRA). The RCRA sought to establish a foundation

for a robust national system of solid waste management with the following goals: “protecting human health and the natural environment from the potential hazards of waste disposal; conserving energy and natural resources; reducing the amount of waste generated through source reduction and recycling; and ensuring the management of waste in an environmentally sound manner” (“EPA History,” 2018). This legislation was one of the first to acknowledge the role of recycling in achieving a federal governmental goal. Subtitle D of the RCRA grants the EPA explicit authority for developing national standards and guidelines for the management of MSW landfills and other solid waste disposal facilities (“EPA History,” 2018).

Despite a few additional amendments designed to update the regulatory criteria set out by the RCRA in 1976, solid waste management and policy in the modern United States largely resembles the foundations laid out by the SWDA and RCRA. The EPA advocates for recycling as a means of waste reduction, touting the environmental and economic benefits of recycling in published reports and on its main website. The EPA’s Sustainable Materials Management (SMM) Program is the driving governmental force behind federal efforts and initiatives to improve both access to and participation in recycling programs across the country. In the EPA’s Sustainable Materials Management Program Strategic Plan for Fiscal Year 2017-2022, the EPA acknowledges its convening role in providing consistent national standards, guidelines and technical support for MSW management as well as facilitating conversation and collaboration amongst states, businesses, and other stakeholders regarding SMM. With stated program goals of conserving resources, reducing waste, slowing climate change, and minimizing environmental impacts, the EPA asserts that “access to and increased utilization of U.S. collection, processing, and recycling infrastructure is imperative if SMM is to succeed” (2015, p.2).

The Current Role of States and Municipalities in Regulating Recycling

While the EPA is responsible for the standardization and establishment of national minimum technical standards and regulatory criteria, state and local governments assume nearly full responsibility for MSW management. There is no federal legislation that mandates the recycling of municipal solid waste (MSW) in the United States. Motivated by their constituents and the EPA, many policymakers and government officials have sought to reduce the amount of MSW being sent to landfills for final disposal by advancing recycling through policy. Across the country, states and localities have implemented a variety of such policy mechanisms including government subsidization of recycling programs, legal recycling requirements, mandatory recycled content standards for products and/or materials, taxes on the use of virgin (non-recycled) materials and resources, universal fees for recycling, and volumetric unit-based pricing systems (aka “Pay-As-You-Throw”) for residential trash disposal.

The term “legal recycling requirements” is used loosely to include any governmental stipulation that holds an individual or entity liable for matters involving participation in MSW recycling. Such requirements vary across the country both in *who* they define as the legally responsible party for compliance with the requirement and to *what extent* participation in recycling is required. One example of a recycling requirement is a municipality that requires all of the permitted waste haulers operating within their municipality to offer recycling services to all of their clients. In this example, permitted waste haulers, not their clients, would be designated as the responsible party for compliance with the requirement. Permitted waste haulers are not required to actually provide recycling services to their clients, but only to offer recycling services as an available option that their clients can choose to use.

For the purposes of this thesis, the term “recycling mandates” is defined to include only

the legal recycling requirements that require recycling services be made directly available for use. This study focuses exclusively on recycling mandates at the municipal level and their effectiveness for increasing multifamily residents' level of access to recycling services. While recycling mandates have been enacted at both the state and municipal level, municipalities typically assume the responsibility of enforcing the specific standards used to implement state recycling mandates. Likewise, payment structures used to fund multifamily recycling services are typically agreed upon and established by local governments and can vary greatly across municipal borders.

Legal Recycling Requirements in the United States

In the absence of federal legislation that mandates the recycling of MSW in the United States, many states and municipalities have enacted statutes or ordinances that mandate recycling in their respective geographic entities. The nationwide regulatory landscape for MSW recycling consequently appears to be a confusing patchwork of requirements and restrictions. In 2017, the Northeast Recycling Council compiled documentation of all disposal bans and mandatory recycling laws for each of the 50 states. These disposal bans and laws were not necessarily specific to components of the MSW stream—listed regulations affected materials ranging from recyclable paper and plastic containers to friable asbestos and lead acid batteries. The materials most commonly affected by disposal bans and recycling laws were non-traditional, non-MSW recyclables such as mercuric oxide batteries, computers, cathode ray tubes (CRTs), and mercury-containing products (NERC, 2017).

Each state specified whether their disposal ban(s) apply to disposal facilities or generators. The term “disposal facilities” generally refers to the sites where waste materials are eventually sent to be processed or buried, such as a landfill or material recovery facility (MRF)

for recyclables. The term “generators” typically refers to the sources of waste production—including haulers, municipalities, commercial entities (i.e. restaurants, hotels), and residences—whose activities generate waste. Statewide disposal bans hold the designated party as legally responsible (and therefore punishable) for ensuring that proper disposal methods are used for the relevant material(s). The study found that 22 states have at least one mandatory recycling requirement and 49 states have at least one item subject to a disposal ban in solid waste facilities—the most common banned item being a lead-acid battery (NERC, 2017). The distribution of these mandatory recycling laws as recorded by NERC is displayed in Figure 1.

FIGURE 1. DISPOSAL BANS AND RECYCLING REQUIREMENTS IN THE U.S.



SOURCE: NERC, 2017.

Multifamily Recycling Policies in the United States

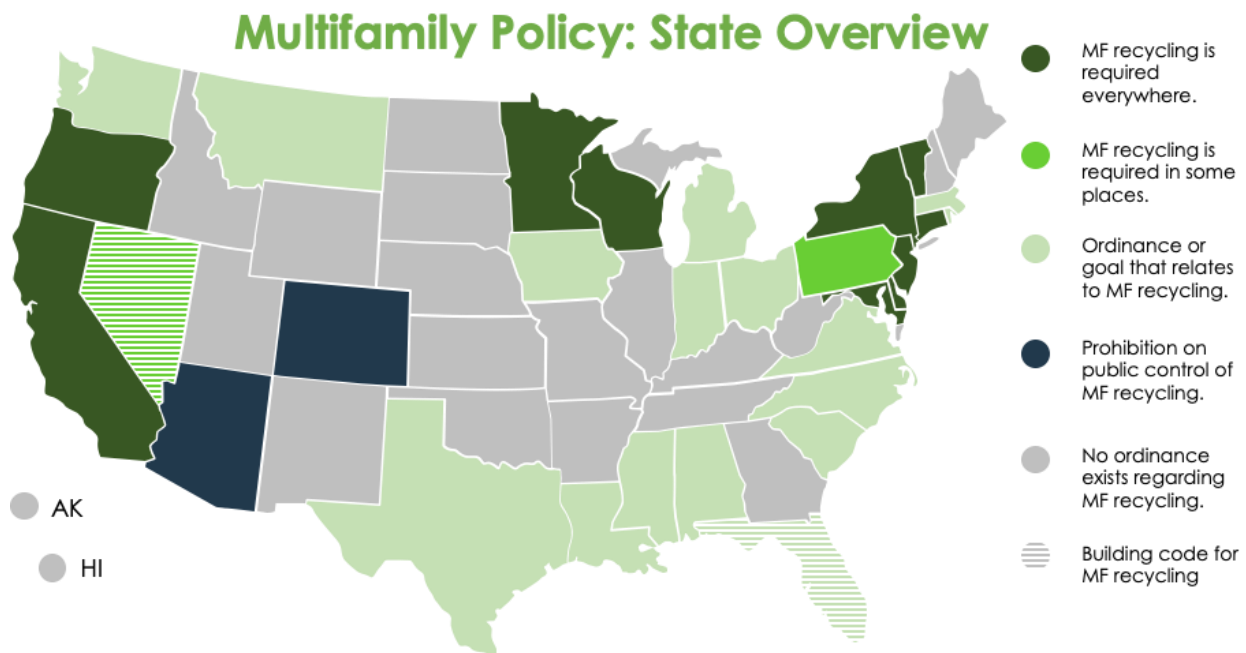
The Recycling Partnership, a national 501(c)(3) nonprofit organization, conducted a separate study to assess the prevalence of mandatory recycling laws in the United States and

their relation to recycling services at multifamily properties. The Recycling Partnership underwent a research process similar to the one used by the Northeast Recycling Council, conducting interviews with all 50 state recycling program leaders to complete a comprehensive evaluation of the nation's recycling policies. The Recycling Partnership's study had a narrower focus on MSW and multifamily properties, focusing only on state policies that impacted, directly or indirectly, the collection of only traditional recyclables (paper, bottles, cans, cardboard, etc.) at multifamily properties. The organization found that 15 out of 50 states had a statewide policy that directly targeted the collection of recyclables at multifamily properties. These 15 statewide policies were subcategorized into the following groups: universal mandatory recycling laws (10 states), mandatory recycling laws in areas of the state that met a specified population requirement (2 states), universal building codes that require a designated recycling collection zone at any newly constructed or majorly renovated multifamily property (2 states), and a prohibition on public control of multifamily recycling (2 states). Statewide policies that indirectly targets the collection of recyclables at multifamily properties (i.e. a waste reduction goal or landfill disposal ban on common recyclable materials) were found in 25 of 50 states (Schwartz, 2018). Figure 2 displays the different state regulations and policies affecting multifamily recycling in the United States, using variations in both color and shading to demarcate the different categories of direct policy.

The Recycling Partnership's research extended beyond the scope of state legislation to include municipal ordinances as well. Using the American Community Survey 2016 5-Year dataset, cities ranking #26-#126 in population size were selected to be interviewed by The Recycling Partnership. The 25 largest cities in the country were excluded from interviews because their proportion of multifamily housing units to total housing units was so much greater

than the rest of the country and their characteristics were suspected to be less applicable to the rest of the country. Of the 100 municipalities that fell within the population parameters, 67 completed an interview with The Recycling Partnership. A second category of municipalities were also selected for interviews, but not used to generate descriptive statistics about the current multifamily recycling landscape in the United States. This category was comprised of cities, counties, or waste management districts that were recommended by state recycling leaders for having engaged in efforts to improve multifamily recycling (Schwartz, 2018).

FIGURE 2. MULTIFAMILY RECYCLING POLICY IN THE U.S.



SOURCE: THE RECYCLING PARTNERSHIP, 2018.

Of the 67 cities interviewed, 30 had an ordinance pertaining to the collection of recyclables at multifamily properties. The majority of these municipal ordinances (80%) were simply a result of compliance with state legislation. Of the 6 municipalities with ordinances that were not products of state legislation, only 3 actually required that multifamily residents have access to recycling services. Instead, the other 3 municipal ordinances required only that property managers have an option to offer recycling service to their residents. In 2 of these 3

cities, the option to offer recycling service was ensured by a permitting requirement for all private haulers to offer recycling services at multifamily properties; for the third city, the option to offer recycling service was ensured by a building code that required a designated recycling collection zone at any newly constructed or majorly renovated multifamily property (Schwartz, 2018).

While prior research conducted by NERC and The Recycling Partnership explains where recycling mandates and other legislation affecting multifamily residents exist, it does not address how effective these policies are for securing access to recycling services for multifamily residents. This thesis helps to fill this knowledge gap in the research by conducting a unique analysis of municipal recycling mandates as a mechanism for increasing multifamily residents' access to recycling services. To conduct such an analysis, it is first essential to clarify what circumstances constitute proper "access" to recycling services and how they can be measured. The following section offers a summary of existing literature on recycling and signifies the importance of using capacity, convenience, and compliance agent standards for measuring access to recycling services at multifamily properties.

Measuring Access to Recycling Services for Multifamily Residents

The operational definition of "available" and legally compliant recycling services differs between state and municipal legislation and regulations. Because of the different circumstances that residents of multifamily properties experience, it is reasonable to expect that having access to recycling services would look different for residents of multifamily properties than for residents of single-family properties. Further, having recycling services available does not always guarantee that those recycling services are actually accessible to residents of multifamily properties. To have an understanding of what "access" to recycling services looks like for

multifamily properties, one must understand the common barriers associated with recycling services that residents of multifamily properties encounter.

Barriers to Recycling Access Faced by Multifamily Residents

Members of the recycling industry have long worked to overcome the challenges presented by multifamily properties. In 2001, the EPA conducted research on multifamily recycling programs in the United States and published “Multifamily Recycling: A National Study.” This publication offered the first comprehensive analysis of multifamily recycling programs across the country and remains as one of the only bodies of work to identify both the characteristics of successful multifamily recycling programs in the United States as well as the barriers that multifamily recycling programs face. The EPA highlighted a high turnover rate of residents, diverse populations of multifamily properties, and uninterested property managers as some of the most common problems experienced by communities working with multifamily recycling across the country (EPA, 2001).

Nearly two decades later, these barriers are still prevalent in discussions about multifamily recycling. As part of their research on multifamily recycling in 2018, The Recycling Partnership asked leaders of state and municipal recycling programs to report any unique barriers affecting recycling collection at multifamily properties in their respective communities. The Recycling Partnership’s study found the most commonly cited barriers to be the following: limited space, illegal dumping and contamination, and difficulty working with property management. Commonly found in densely-populated urban areas, multifamily residences often have limited physical property space and are unwilling to replace a valuable parking spot with a corral for recycling collection. Where recycling mandates exist, limited physical property space can result in the inconvenient placement of recycling receptacles on or near multifamily

properties. Numerous cities have sought to resolve this issue through the implementation of a building code requirement that requires any new or majorly renovated multifamily residence to construct a designated on-site location for an adequately sized recycling receptacle (Schwartz, 2018).

The issues of illegal dumping and contamination are unfortunate byproducts of working with large residential populations in which one individual's behavior is oftentimes virtually indistinguishable from another's (Schwartz, 2018). Since so many individuals share the use of waste containers at a multifamily property, it can be hard to track or know who is using them in a lawful manner and who is not. Where there is inadequate or inconvenient container capacity for garbage and traditional waste, residents oftentimes turn to dumping their additional waste in recycling receptacles (Schwartz, 2018). Where illegal dumping and contamination is a product of inadequate container capacity or inconvenient location, there is both an issue of access to and participation in recycling services on multifamily properties.

Measures taken to enforce lawful disposal practices and exclude non-residents from access to on-site waste services can be costly and inconvenient to both property managers and residents. Where multifamily properties are considered commercial entities, municipalities are often unable to freely distribute educational materials on the private grounds of the property. This leaves property managers with a great deal of responsibility and power over the maintenance of recycling services on multifamily properties. An invested property manager that is dedicated to furthering the success of a recycling program on their property can help a tremendous amount in the distribution of educational materials and enforcing of proper disposal methods. In such cases where property management is uninterested in recycling services or hesitant to comply with recycling requirements, it may be especially difficult to operate an

efficient program (Schwartz, 2018).

The barriers discussed above are used as a basis for justifying the use of convenience, capacity, and compliance agent designation standards for measuring the level of access to recycling services that multifamily residents experience. These standards have important implications for both assessing the effectiveness of municipal recycling mandates as well as evaluating the fairness of different payments structures used to fund multifamily recycling services. Each of these standards is discussed in greater detail below.

Measuring Access to Recycling: Convenience Standard

A crucial component of measuring access to recycling service is the convenience of the service provided. Previous studies have shown that the convenience of a recycling program is the strongest determinant of recycling behavior, along with social norms and moral considerations (Miafodzyeva and Brandt, 2013). While the majority of municipalities do not offer curbside collection service to their residents that live at multifamily properties, many offer a drop-off center to which any member of the public may bring the recyclables they have generated. Looking strictly at the share of the population with only drop-off recycling programs available to them, multifamily residents are grossly overrepresented—making up 44% of the drop-off only population versus 17% of the total population (SPC, 2016, p. 18).

It is commonly agreed upon that the inconvenience of driving to a drop-off location, especially when trash collection is collected curbside, reduces the likelihood of participation in recycling programs (p. 24). Curbside collection service offers much greater convenience both temporally in the amount of time it takes to participate and spatially in the distance that residents have to travel to participate—especially for residents who do not own a means of individual transportation. For multifamily properties, valet recycling services offer a third, most convenient

option for the collection of recyclables. Valet recycling services typically operate by collecting a designated container for recycling left at the doorstep of each participating housing unit in the complex.

The decreased level of convenience that characterizes so much of multifamily recycling ought to be considered not only as an inhibiting factor for participation, but also as a key determinant of the level of access to recycling programs experienced by residents. Once participation in a recycling program falls below a reasonable threshold of convenience, residents might as well not even be considered to have access to recycling services. Different policies establish opposing views on whether or not the availability of drop-off centers to multifamily residents is sufficient in meeting a requirement for all residents to have access to recycling services. An ideal level of convenience for recycling services may differ geographically in the same way that it does for other waste services like garbage. This thesis takes the first step in formulating what constitutes an acceptable threshold of convenience for recycling programs at multifamily properties by analyzing the existing literature regarding the convenience of recycling receptacles and their placement.

The most frequently cited statistic for proper placement of waste receptacles was actually produced by Walt Disney in the process of designing his Disneyworld park. Disney observed individuals in other theme parks to see how many steps people would be willing to take on average before choosing to litter instead. Disney determined that the magic number was somewhere between 25 and 30 steps. Averaging one step as one foot, there was not to be a stretch of more than 30 feet in Disneyworld without a trash can present (Burnley, 2015). This stipulation, termed as the “Disneyland theory,” is best applied to the placement of waste receptacles in open public spaces and may not be the most suitable standard for waste receptacles

on a large residential property.

In 2003, Jenkins et al. conducted household surveys to measure the effects that the presence of a curbside program for a given recyclable material has on the probability that the material would be recycled at the participating household. The results were astoundingly in favor of curbside programs, stating that the existence of a curbside program for a given recyclable material would increase the probability by 25-50% that over 95% of the material would be recycled (p.311). A later study designed to expand on Jenkins findings determined that the most effective policy for fostering recycling was to improve the convenience of services through one of two means: “providing curbside recycling services (the preferred approach) or locating drop-off recycling centers close enough to people’s residences” (Saphores and Nixon, 2014). A measure for “close enough” was not specified by the authors or the data they collected.

Finally, a study conducted specifically on recycling in multifamily properties found that “factors that decrease the time cost of recycling have significant positive correlations with recycling rates in multifamily dwellings” (Ando and Gosselin, 2005). The two most important elements that positively affect recycling behavior were noted: having an adequate amount of interior space available for sorting and storing the recyclables, and reducing the lateral distance (relative to distance of trash disposal) that multifamily residents must travel to recycling bins to participate (Ando and Gosselin, 2005). This study’s findings reiterate the importance of having convenient multifamily recycling collection—both in respect to the relative location and capacity of in-unit and centralized collection receptacles.

Measuring Access to Recycling: Capacity Standard

Access to recycling service is dependent upon the capacity of the collection containers provided to residents. Very few statutes or municipal ordinances include a volume stipulation for

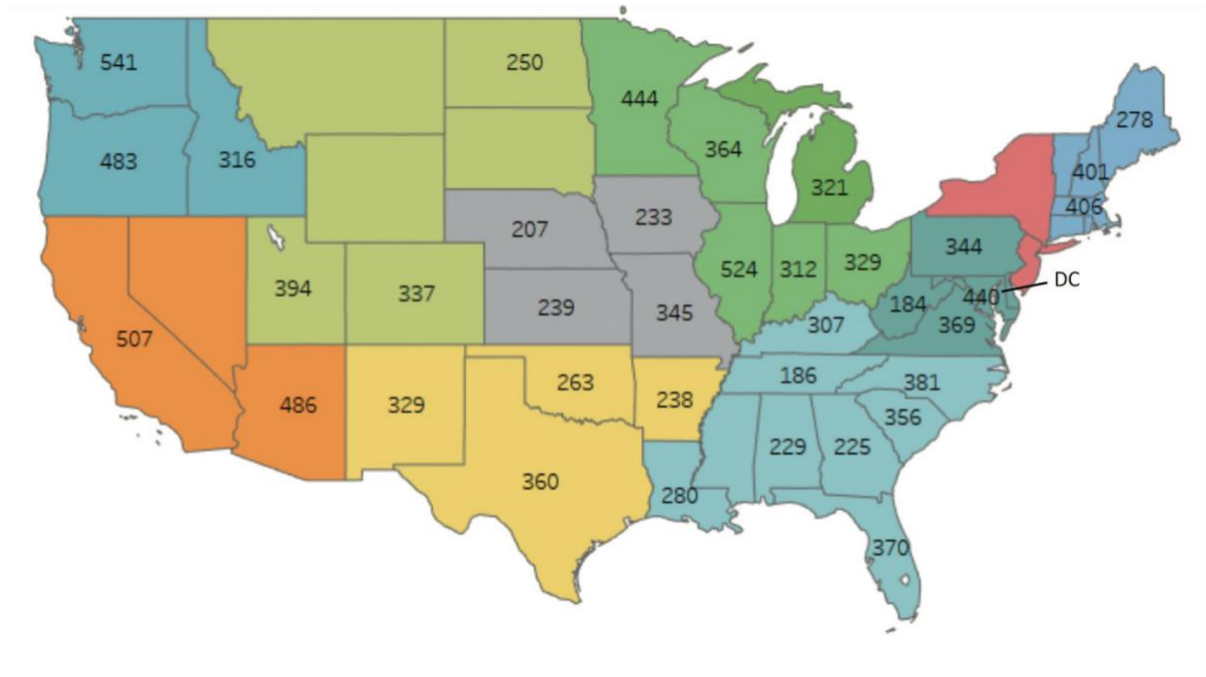
recycling receptacles at multifamily properties. As a result, there are a surfeit of cases across the country where a virtually nonexistent, albeit legally compliant, opportunity for recycling is provided to multifamily residents. One example would be an apartment complex with over 500 units having only a single 96-gallon cart for recyclables for all of its residents to use. This apartment complex would fulfill any legal obligation where recycling service is required to be offered on a property without a stated minimum capacity volume; however, residents of that apartment are not truly able to make use of the recycling service that are technically available to them.

A minimum threshold for the necessary capacity of recycling containers and frequency of recycling collection to provide true access to recycling for multifamily residents ought to be defined using tonnage data for multifamily properties and the generation rate of recyclables per-unit. Unfortunately, such data is extraordinarily difficult to find. Zero states currently require that multifamily recycling tonnages be reported separately from other commercial and/or residential properties; as a result, haulers maximize the cost-efficiency of their routes by servicing multifamily properties on the same collection route as commercial businesses and even single-family residences. The compounding of multifamily recyclable tonnages with commercial or single-family tonnages makes it exceptionally difficult to measure or estimate the tonnage of recyclables generated and captured by a multifamily property—much less a single multifamily residential unit (Schwartz, 2018). The EPA’s “Multifamily Recycling: A National Study” established an arbitrary recommended container capacity of at least 90-gallons with a single set of 2-3 containers for every 15-20 residential units at a multifamily property. No explanation or data analysis was offered as a justification for choosing that amount (p. 53).

Contrary to the absence of data on the recycling generation rate of multifamily properties,

a considerable amount of data exists to describe the tonnage of recyclables generated and captured at a single-family residence. The Recycling Partnership’s “2016 State of Curbside Report” compiled the annual state recovery averages measured as pounds of recyclables per household per year (lbs/hh/yr), as displayed in Figure 3.

FIGURE 3. STATE RECOVERY AVERAGES (LBS/HOUSEHOLD/YEAR)



SOURCE: THE RECYCLING PARTNERSHIP, 2016.

The national average for recyclables captured by recycling programs from households across the United States was 357 lbs/hh/yr (p.5). These averages are likely to include data collected from tonnages reported at multifamily properties, however, it is unknown whether multifamily residents differ from the average waste generation characteristics of the rest of the nation. Future research ought to explore whether or not a multifamily household unit is likely to generate more, less, or the same number of pounds of recyclables as does a single-family household unit.

Measuring Access to Recycling: Compliance Agent Standard

One of the most important features of multifamily recycling that differentiates it from

single-family recycling is that individual residents have restricted agency to arrange for on-site recycling services. Nearly all residents of multifamily properties do not have the ability to independently set-up or subscribe to recycling services for themselves. Instead, it is the role of a designated third party—typically the property management, to arrange for the collection of recyclables that are generated by the residents at a multifamily property. Recycling collection at multifamily properties thus typically presents a principal-agent problem in which multifamily property management (or a different third party) is empowered to make decisions on behalf of their residents who might have conflicting interests with their own (Kenton, 2018). While it is not universally true, many multifamily properties operate as commercial entities whose economic bottom line is to fill rooms with tenants and generate a profit. Enrolling in sustainable waste management practices such as recycling are oftentimes an additional cost to multifamily properties and thus don't align with the primary motivations of property management. Where recycling services are not required to be offered directly to the residents of multifamily properties, residents who wish to recycle may find that convincing their property managers to provide recycling services may be a cumbersome if not impossible task.

Even where multifamily recycling requirements have been implemented, the principal-agent problem can still exist. One prominent example of this is the state of Oregon's "Opportunity to Recycle Act of 1983" which required that every person in the state be provided with an opportunity to recycle. The law used vague wording regarding multifamily residents and didn't clarify what an opportunity to recycle meant for them. In practice, municipalities often considered that a multifamily resident had an opportunity to recycle if recycling services had been offered to the property manager of the multifamily property where the resident lived. This interpretation of the law subjected residents of multifamily properties to the will of their property

managers who consistently choose to abstain from recycling services when it cost more money than trash collection (Schwartz, 2018). In 2015, the Oregon legislature amended the act to require that all “residential and commercial tenants”—not simply the landlord or property manager who owns their property—must have the individual opportunity to participate in recycling by July 1, 2022 (ORS 459A.005, 2017).

The principal-agent problem affecting multifamily recycling is emblematic of the general nature of the relationship between multifamily residents and their property managers. For administrative and economic efficiency, it is sensible that a property manager (or other third party) is responsible for orchestrating the on-site waste collection for all of its residents. Public policy need not be used to try and alter the relationship between multifamily residents and their property managers, but rather to acknowledge and accept the role of property managers as a key agent for providing access to recycling services to multifamily residents. For recycling mandates to be effective, it is important that they contain specific and appropriate language that clarifies 1) who is required to have access to recycling services and 2) who is designated as the responsible party for providing access to recycling services at multifamily properties and thus complying with the mandate.

Payment Structures Used to Finance Municipal Recycling Services

Evaluating Fairness of Cost Distribution for Multifamily Recycling Services

Municipal governments use a number of different strategies to pay for public recycling services. These payment strategies can differ in how these payments are carried out, who is required to pay, and the amount that is required to be paid. Across North Carolina, local governments typically rely on one of two main sources of funding for recycling programs: solid waste fee revenue and general tax revenue (Royster, 2014). Solid waste fees can include a

number of different expenses such as solid waste fees, recycling fees, bulk waste removal fees, and availability fees. General tax revenue is usually derived from property taxes that are paid by all owners of improved property—commercial or residential—and typically scaled to the value of the property owned.

Where fees are used instead of general tax revenue, residents are sometimes able to abstain from paying fees for services they do not use. Voluntary user fees allow for individuals to take the liberty of deciding whether or not they would like to pay to participate in or subscribe to a service such as recycling collection. In other words, user fees allow residents the opportunity to choose whether or not they would like to pay to use a service that the government provides. Residents are not afforded such liberties where taxes are used to fund government services such as recycling. Where municipal recycling services are funded by tax revenue, every taxpaying constituent is required to contribute financially to the program regardless of whether or not they intend to make use of such services. This restriction of liberty, especially as it relates to payment structures used to fund recycling services, is often justified using paternalistic principles. Because recycling is a pro-social behavior with positive economic and environmental benefits, many believe that all constituents ought to be provided with automatic recycling collection and sometimes even legally obligated to participate in recycling. This belief is highly controversial and strikes a timeless debate over the proper role of government for providing access to and mandating participation in pro-social activities such as recycling.

Even where user fees are implemented to fund recycling services, the nature of multifamily properties makes it complicated to preserve the individual liberty of its residents regarding the decision to subscribe to services. Residents of multifamily properties typically have restricted agency concerning matters to the upkeep and maintenance of the multifamily

property. Where opt-in or subscription recycling services exist, property management usually makes a decision on behalf of all of its residents to either pay for or abstain from using municipal recycling services. Since the interests of property management and the residents they represent might not always align, this can create a frustrating situation for management and residents alike. Where recycling mandates require recycling services to be provided to multifamily properties, neither residents of multifamily properties or their respective property management are given the autonomy to decide to pay for such a service.

As aforementioned, residents of multifamily properties routinely experience lower levels of access to recycling service than residents of single-family homes. Since multifamily properties are often classified as commercial entities and considered ineligible to receive municipal recycling services, residents of multifamily properties face a much greater likelihood of paying into a municipal recycling program whose service they are excluded from using. This is especially true where recycling services are funded by a tax or fee that is universally distributed amongst residents, but recycling services are not provided automatically to multifamily and single-family residents alike.

Other Factors that Affect Payment Structures Used for Multifamily Recycling Services

Municipalities face many logistical hurdles when designing equitable payment strategies for environmental services: limited budgets, political feasibility, program efficiency, limited budgets, and regulatory constraints. While individual preferences might best be satisfied by allowing residents of multifamily properties to pay and use municipal recycling services on an individual basis, this would create a huge logistical challenge for coordinating collection through property management. Furthermore, a problem of free-riders would likely arise if residents of multifamily properties did not take the appropriate measures to ensure that only those who paid

for recycling service would be able to use it. To try and restrict consumption would be a time and energy-consuming initiative that would serve very little communal good. Different payment strategies and their cost distributions ought to be evaluated not only with an idealistic consideration of fairness, but also with the real-world consideration of factors that affect the feasible and effective implementation of municipal recycling services at multifamily properties.

Linking Recycling Mandates and Fees with Access to Recycling at Multifamily Properties

In “Multifamily Recycling: A National Study,” the EPA measured the success of a multifamily recycling program by the percentage of its recyclable waste that was diverted from the landfill—aka a program’s waste-diversion rate. One shared characteristic of these programs was the implementation of a mandatory participation sanction, which the EPA noted as a common theme of 90% of communities with high diversion rates at multifamily properties (EPA, 2001, p. 53). Furthermore, “higher fees and a greater likelihood of a fee for multifamily recycling is associated with higher diversion rates...the proportion of communities paying for this service from taxes decreases from 50 percent of those with the lowest diversion rate to 27 percent of those with the highest diversion rate” (p. 45).

While the recommendations and findings of EPA’s report are helpful in setting the stage for multifamily recycling policy and describing the technical components correlated with high-diversion rates, the causal link between such components and high-diversion rates remains largely unexplored. Furthermore, nearly two decades have passed since the publication of the study’s results. With an ever-changing waste stream and evolving collection system logistics, the results of the study are at risk of being outdated.

Much of the reports and studies published about multifamily recycling on a national level have an absence of conclusive, data-driven evaluations. No current literature explores the link

between the recycling mandates implemented across the United States and their effectiveness for providing access to recycling at multifamily properties. While the EPA's study reports a strong correlation between higher diversion rates and the enforcement of recycling mandates, it is unclear through which mechanisms these policies are affecting the level of access to recycling programs experienced by residents of multifamily properties or the fairness of how multifamily recycling program costs are distributed. This study analyzes the effectiveness of current recycling mandates in providing access to, and not simply availability of recycling services to residents of multifamily properties as measured by three standards: the convenience of recycling services available to residents of multifamily properties, the container capacity of recycling collection receptacles at multifamily properties, and who the designated agent is for compliance with the recycling mandate. These three standards are defined in greater detail in the third chapter.

CHAPTER III. METHODS

Overview of Methods

This thesis aims to answer two main research questions: “How effective are existing municipal recycling mandates for providing access to recycling services to multifamily residents?” and “How do different payment structures used to fund multifamily recycling services distribute costs amongst residents of single-family and multifamily properties? Is this cost distribution perceived as fair?” Two different methods of data collection were used to answer these research questions accordingly. First, the municipal codes of the 100 largest municipalities in the United States were examined to determine whether or not they contained an ordinance mandating that recycling services be provided for residents of multifamily properties. These recycling mandates were then evaluated using the three standards for measuring access to recycling services at multifamily properties that were described in the second chapter: convenience, capacity, and compliance agent designation. Second, an exploratory case study was carried out to compare the fairness of the payment structures used to fund multifamily recycling services in two North Carolinian municipalities: Orange County and the City of Durham. These data collection methods are discussed in more detail throughout this chapter.

Content Analysis: Analyzing Municipal Recycling Mandates for Multifamily Properties

The research sample for analyzing the effectiveness of municipal recycling mandates was comprised of the 100 largest municipalities in the United States according to population size. Larger municipalities were selected to be in the research sample because they typically have a higher proportion of multifamily housing units to total housing units and thus are more likely to be engaged with recycling services at multifamily properties. The SPC’s “2015-16 Centralized Study on Availability of Plastic Recycling” affirms that recycling services are most widely

available in larger communities with populations of more than 125,000 people (2016).

First, the recycling programs operated by the largest 100 municipalities in the United States were researched extensively online to determine whether or not there was a municipal recycling mandate for multifamily properties. Where recycling mandates for multifamily properties had been implemented, the respective municipality's online code was searched for the relevant ordinances. The content of these governmental texts was then analyzed for any wording or stipulation that acknowledged one of the standards for measuring access to recycling services: the convenience, capacity, or compliance agent designation for the required recycling services.

A numerical value of "0" was assigned to municipal recycling mandates that failed to incorporate any acknowledgement of the relevant standard, and a "1" was assigned for mandates that explicitly mentioned the relevant criterion. For every municipal ordinance that was assigned a "1" for at least one of the three categories of standards, either the exact wording or a paraphrased summary of each stipulation was recorded. It was then documented whether or not these stipulations were considered to be vaguely worded in a manner that would make it difficult for a municipality to enforce. Mandates with unambiguous, enforceable stipulations were considered to be more effective than those with vague wording for providing access to recycling services to residents of multifamily properties.

Case Study: Evaluating Multifamily Recycling Payment Structures and Cost Distribution

A case study, as defined by the U.S. Government Accountability Office, is "a method of learning about a complex instance based on a comprehensive understanding of the instance" (1990, p. 79). Payment strategies for multifamily recycling constitute as a complex instance; a number of different factors affect the financial mechanisms that governments use to fund municipal recycling services and there is virtually no existing research on how costs to fund such

services are distributed amongst residents of single-family and multifamily properties. It is also difficult to measure the relationship between the financial mechanisms used to fund multifamily recycling services and the level of access to recycling services that they provide to residents of multifamily properties. This case study serves a descriptive and exploratory purpose by explaining how different payment structures used to fund multifamily recycling services distribute costs amongst residents of single-family and multifamily properties and attempting to gauge how fair this cost distribution is perceived to be.

The “fairness” of each payment structure will be assessed by comparing the parties that pay into a recycling program with the parties that have access to using the recycling program’s service. Individual preferences, societal benefits and harms, cost-efficiency, and the voluntary nature of transactions are given consideration when evaluating the different payment structures. This evaluation does not justify one strategy of payment over another as being more correct; instead, it lays out the different values that are endorsed by each strategy so that a governmental entity may knowingly select a preferred method that aligns with its political goals.

Two municipalities in North Carolina were included in this case study: City of Durham, and Orange County. These municipalities were selected on the basis of convenience and representation. Municipal codes, ordinances, and tax legislation concerning recycling services at multifamily properties was reviewed before conducting an in-person interview with the public official overseeing waste management operations for the respective municipality. The state of North Carolina does not explicitly require that property managers offer recycling services to their residents, which allows for greater variation in both the payment strategies used for multifamily recycling and the service provided itself. While located within 15 minutes of one another, Orange County and the City of Durham employ distinct strategies of payment and regulatory

policies for multifamily recycling, which provide important variations to represent in the case study. Beyond the representative advantages these municipalities have to offer, the close proximity of their geographic locations made them well-suited for in-person interviews.

In-person interviews were preferable to phone interviews since they provide an opportunity for a thorough exchange of information and ability to contextualize responses. The interviews were conducted with at least one employee of the respective municipality's solid waste management department to learn about the different payment structure that is used to fund multifamily recycling services and its distribution of costs to both residents of single-family and multifamily properties. Each interview consisted primarily of open-ended questions regarding the strategy of payment used for recycling services at multifamily properties in the municipality (see Appendix A for interview questionnaire). Follow-up questions on the observed degree of accessibility and quality of this recycling service were used to evaluate the costs and benefits of each structure—particularly for different styles and classifications of multifamily buildings. This case study serves an important role for grounding the policy recommendations provided by this research in the responses of interviewees who have real-world considerations of payment strategies for multifamily recycling and its associated costs.

Limitations of Methods

The methodology used for both assessing the effectiveness of municipal recycling mandates and the fairness of different payment structures' cost distribution have important limitations regarding the generalizability of its findings. By selecting only the 100 largest municipalities in the United States as the research sample for evaluating municipal codes, the research sample is not representative of the general population of municipalities nationwide. The scope of the study is also rather limited which entirely compromises the generalizability of

its findings. Both instances included in the case study are located in North Carolina and are ranked similarly in terms of population and urbanicity.

CHAPTER IV. FINDINGS AND ANALYSIS

The municipal codes of the 100 largest municipalities in the United States were examined to determine whether or not they contained an ordinance mandating that recycling services be provided for residents of multifamily properties. In addition, an exploratory case study was conducted to compare the fairness of the payment structures used to fund multifamily recycling services in two municipalities in North Carolina, Orange County and the City of Durham. The empirical results of this analysis were organized into two categories, Municipal Ordinances and Multifamily Recycling Payment Structures. The empirical results regarding Municipal Ordinances were then sorted into four distinct subcategories: Location and Political Affiliation, Convenience Stipulations, Capacity Stipulations, and Compliance Agent Stipulations. While the findings from each of the categories of research are distinct from one another, they can be interwoven to reveal major themes that illustrate the effectiveness of current multifamily recycling mandates in the United States as well as the fairness of their affiliated recycling fees and payment structures for residents of multifamily properties.

Municipal Ordinances: Location and Political Affiliation

Of the 100 largest municipalities in the United States, 41 municipalities had ordinances that mandated recycling services be offered at multifamily properties. These recycling mandates were either targeted mandates that required recycling at multifamily properties specifically or were universal mandates recycling at all properties in the respective municipality. Three criteria were used to evaluate the 41 municipal ordinances that mandated recycling at multifamily properties: the geographic distribution of municipal ordinances across the U.S. Census Bureau's regions, the presence of a statewide recycling mandate in conjunction with the municipal ordinance, and the recent political affiliation of the state where the municipality was located.

FIGURE 4. MAP OF 100 LARGEST MUNICIPALITIES WITH RECYCLING ORDINANCES

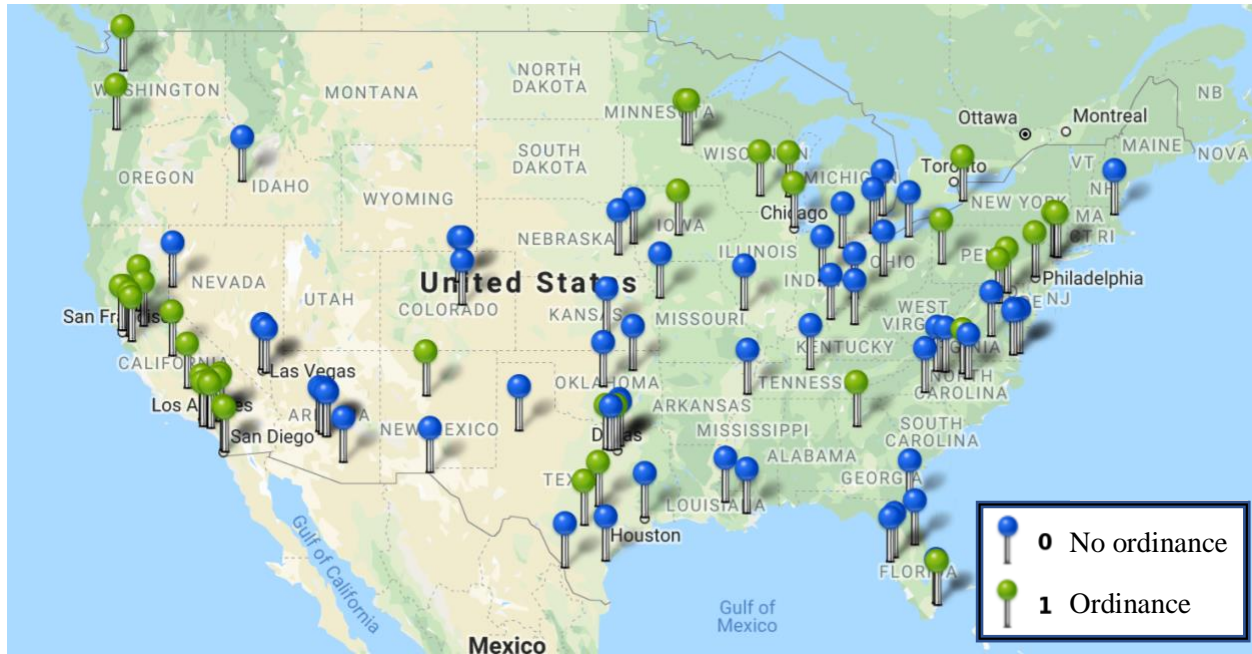


TABLE 2. GEOGRAPHIC DISTRIBUTION OF MUNICIPAL ORDINANCES

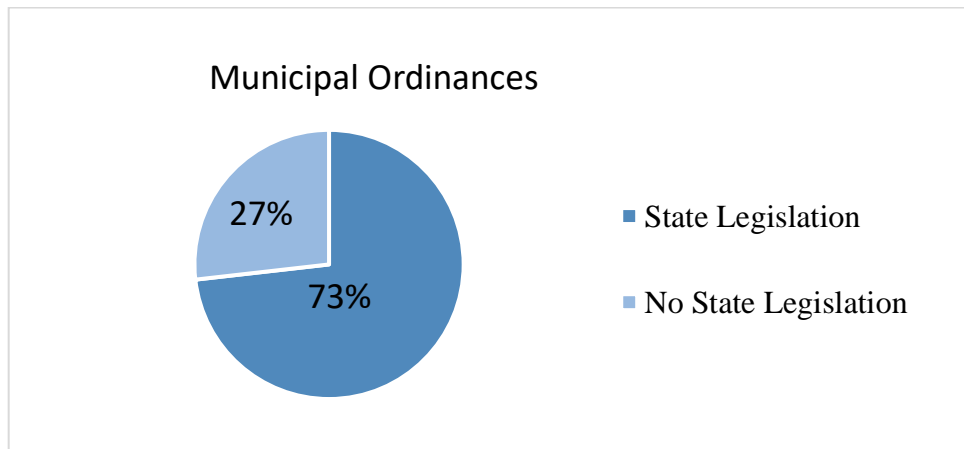
Geographic Region (Census Bureau)	Number of Ordinances	Percentage of Total Number of Ordinances
Northeast	6	14.6%
New England	0	0.0%
Middle Atlantic	6	14.6%
Midwest	6	14.6%
East North Central	3	7.3%
West North Central	3	7.3%
South	9	22.0%
South Atlantic	5	12.2%
East South Central	0	0.0%
West South Central	4	9.8%

West	20	48.8%
Mountain	1	2.4%
Pacific	19	46.3%

SOURCE: U.S. CENSUS BUREAU, N.D.

As evidenced by Figure 4 and Table 2 above, the majority of municipal ordinances were located in the coastal areas of the country including the West Pacific, South Atlantic, and Middle Atlantic divisions. Nearly half of the ordinances (20/41) were found in the Pacific West with California municipalities comprising 17 of them. It is important to remember that these statistics are not necessarily representative of the entire United States but rather only the 100 largest municipalities, of which the majority are located in coastal regions.

TABLE 3. MUNICIPAL ORDINANCES AND STATE LEGISLATION



Of the 41 municipalities with ordinances that mandated recycling at multifamily properties, 30 municipalities (including Washington, D.C.) were located in states that had a statewide recycling mandate which required all respective municipalities to have an ordinance in compliance with the state legislation. The 11 municipal ordinances that were not required by state legislation were located in the following cities: Atlanta, GA; Durham, NC; Seattle, WA; Des Moines, IA; Albuquerque, NM; Austin, TX; Fort Worth, TX; Dallas, TX; San Antonio, TX;

Chicago, IL; Miami, FL. These 11 municipal codes are primarily located in the South, with 4 in the South West Central division and 3 in the West South Central division. These findings suggest that the majority of recycling mandates that affect multifamily properties are products of state legislation rather than an independent initiative of the individual municipality.

Finally, data was gathered on the recent political affiliation of the states where municipalities with ordinances that mandated recycling at multifamily properties were located. State party affiliation data was retrieved from a 2017 table composed from Gallup Daily tracking. All of the 41 municipalities with ordinances that mandated recycling at multifamily properties were located in states that were classified as “Solid Democratic” (12/41) or “Competitive” (29/41). Zero municipalities were located in states that were classified as “Solid Republican.” In recent years, environmental issues and concerns are typically more prominent on and associated with more liberal political agendas. The absence of recycling mandates in states that are classified as “Solid Republican” may be explained by different political aims, or simply by the fact that most of the 100 largest municipalities in the United States are found in competitive or liberal-leaning states.

Municipal Ordinances: Convenience Stipulations

Municipal ordinances that mandated recycling at multifamily properties were scanned for any language indicating a stipulation or requirement regarding the convenience of the recycling services that must be provided. The stipulations were primarily found either in the initial description of the intent of the ordinance or in a section regarding collection container location and requirements. Of the 41 municipal ordinances analyzed, 26 included a statement that mentioned a convenience stipulation for the provided recycling service. Of these 26 statements, just shy of half (12) were vaguely worded in a manner that makes it difficult for a municipality to

enforce (i.e. simply using the term “location that is convenient” or “reasonably accessible”). In Table 4, the 14 municipal ordinances that were considered as non-vague are sorted into the following categories of stipulations for the convenience of recycling receptacles: located on-site, located near trash, similar nature to trash, and distance from dwelling unit.

TABLE 4. CATEGORIZATION OF CONVENIENCE STIPULATIONS

Convenience Stipulation for Recycling Receptacles	Number of Ordinances	Percentage of Total Number of Ordinances
Located On-site*	5	12.2%
With State Legislation	1	2.4%
Without State Legislation	4	9.8%
Located Near Trash	9	22.0%
With State Legislation	7	17.1%
Without State Legislation	2	4.9%
Similar Nature to Trash	4	9.8%
With State Legislation	2	4.9%
Without State Legislation	2	4.9%
Distance from Dwelling Unit	2	4.9%
With State Legislation	2	4.9%
Without State Legislation	0	0.0%

*One ordinance used the wording “on-site or on a property immediately adjacent thereto”

The most popular stipulations for the convenience of recycling receptacles was to require that they be located near trash. Exact phrasing differed amongst the ordinances from “containers

located near each other,” “recycling located as near to the trash as is feasible,” and “recycling is adjacent or in close proximity to refuse.” This stipulation is sensible for application to a wide array of potential housing and waste collection situations; setting a universal measure such as maximum allowed distance from dwelling units, while most easily enforceable, may be less feasible and/or practical for some multifamily properties than others. “Twinning the bins,” or placing similar recycling and trash receptacles immediately besides one another, is a commonly recommended practice that is proven to increase recycling rates (University of British Columbia, 2017). Amongst all of the ordinances, the correlation of state legislation is unclear. Ordinances that required recycling receptacles to be on-site of the multifamily property were largely found in municipalities where there was not a statewide recycling mandate, while ordinances that required recycling receptacles to be near to trash receptacles were largely found in municipalities where there was indeed a statewide recycling mandate. One potential explanation for this finding may be that municipalities located in states with statewide recycling mandates may be more inclined to impose higher standards for recycling receptacle collection container location than municipalities located in states without such mandates.

Municipal Ordinances: Capacity Stipulations

Prior research has raised concerns that where a minimum capacity volume for recycling receptacles at a multifamily property is not established, residents are at greater risk of having diminished levels of access to recycling service (Schwartz, 2018). Of the 41 municipal ordinances examined in this research, 28 included a minimum capacity requirement for recycling receptacles provided to residents. Of these 28 minimum capacity requirements, 20 were considered to be vaguely worded and difficult to enforce. A few examples of phrases used in vaguely worded minimum capacity requirements include “sufficient capacity necessary,”

“sufficient number of bulk containers,” and “of appropriate number and size.” Concrete definitions for the terms “sufficient” and “appropriate” were not provided, leaving a great deal of room for potential debate over what might constitute a violation of such policy.

TABLE 5. CATEGORIZATION OF CAPACITY STIPULATIONS

Original Capacity Stipulation for Recycling Receptacles	Converted Capacity Stipulation for Recycling Receptacles (gallons)
One standard container (32 gallons per unit)	32 gallons per unit
One outdoor collection bin (of at least 3 cubic yards) per 12 dwelling units of which 50% of bins should be dedicated for recycling in sufficient quantity	25.2 gallons per unit
Number of dwelling units x 20 gallons; sufficient number of containers	20 gallons per unit
1 cubic yard/16 units	12.6 gallons per unit
Minimum storage of 3 cubic ft.	22.4 gallons for complex
3 gallons x Number of living units	3 gallons per unit
Greater than a single 35-gallon container for the building as a whole	35-gallons for complex
Equal to or greater than 11 gallons per unit, per week	11 gallons per unit

For the 8 municipal ordinances that contained enforceable capacity stipulations, there was a great range in required volumes; the different capacity stipulations are detailed in Table 5

above. The average capacity stipulation per-unit for recycling receptacles is 17.3 gallons per unit and the average capacity stipulation for an entire multifamily property's recycling receptacles is 28.7 gallons. The range for capacity stipulations per-unit is 29 gallons with the minimum stipulation being 3 gallons per unit and the maximum stipulation being 32 gallons per unit. For context, a standard recycling bin provided to a single-family home with weekly collection in the United States ranges from 18-gallons to 96-gallons in size.

The EPA's "Multifamily Recycling: A National Study" established an arbitrary recommended container capacity of anywhere between 4.5 to 18 gallons of recycling containers per-unit at a multifamily property (EPA, 2001). Previous studies aimed to capture rates of multifamily recycling generation produce similarly diverse recommendations, ranging from an anticipated 1.2 lbs/week/unit to 16 lbs/week/unit of recyclables generation from a residential unit on a multifamily property (Schwartz, 2018). This discrepancy of measurements as well as the capacity stipulations included in the aforementioned municipal codes indicate a significant gap in the research regarding a conclusive, data-driven recommendation for the necessary recycling receptacle capacity to allow residents of multifamily properties to truly have access to recycling services.

Municipal Ordinances: Compliance Agent Stipulations

Of the three subcategories of stipulations in municipal ordinances that were analyzed in this research, the most prevalent was compliance agent stipulations. Compliance agent stipulations designate a particular individual as being principally responsible for compliance with the municipal ordinance that mandates recycling at multifamily properties. Compliance agent stipulations were found in 38 of the 41 municipal ordinances that mandated recycling at multifamily properties, making up more than 90%. The specified agents have varying roles and

responsibilities amongst the different municipalities; practicing compliance can look different for the designated, responsible agent depending on the regulations that have been established in the ordinance. The most common titles of the specified agents for compliance have been compiled below in Table 6.

TABLE 6. SUMMARIZATION OF COMPLIANCE AGENT STIPULATIONS

Compliance Agent Titles	Number of Ordinances	Percentage of Total Number of Ordinances
Owner, Landlord	31	75.6%
Manager, Operator, Person in charge of dwellings, Superintendent, Administrative Authority, Designated Agent/Entity	19	46.3%
Occupant, Lessee, Tenant	11	26.8%
Generator	5	12.2%
City or Franchise	1	2.4%
Waste Collector	1	2.4%
Responsible party/parties for financing the alterations	1	2.4%
Person required to enter into a contract	1	2.4%
Condominium association	1	2.4%
Employee of a premises	1	2.4%

Some of the titles used to specify agents for compliance leave greater discretion for interpretation

than others—for example, a “designated agent.” Other titles used to specify agents for compliance are fundamentally attached to an existing role, such as “occupant” or “owner.”

It is helpful to look at trends regarding compliance agents so that recycling programs and future research can delve into the best management practices for working with different roles and the effects and how it might affect rates of compliance and the quality of recycling service to multifamily residents that it produces. It is crucial that the designated compliance agent can fulfill their obligations in a reasonable manner. For instance, residents of multifamily properties who are unable to arrange for recycling services on their own should not be held responsible under the law for ensuring that such service is provided on their residential property site. Inversely, property managers ought not be penalized for residents of multifamily properties that fail to properly utilize recycling services despite having been provided adequate information and signage for recycling multifamily property administration to their tenants, it should be noted that some residents of multifamily properties may be receiving a penalty for the actions of others—an unfortunate circumstance that residents of single-family homes do not have to face. Since the roles and responsibilities of compliance vary so greatly amongst the 41 municipal ordinances analyzed, it would be problematic to recommend one title over another without considering the context of the specific legislation first.

Multifamily Recycling Payment Structures

Two municipalities in North Carolina, Orange County and City of Durham, were interviewed about their payment structures that are used to fund multifamily recycling service. An interview with Orange County confirmed that it funds public recycling service and efforts by charging a mandatory Solid Waste Programs Fee (SWPF) to all owners of improved property in Orange County jurisdictions. In previous years, Orange County Solid Waste Management

Department implemented a tiered fee that ascribed different fee amounts for different recycling services, but found the system to be difficult to administer. The current fee is administered by the Orange County Tax Office to property owners for every individual unit, or “front door” of their property. In the case of an apartment complex, the cost of the SWPF is usually transferred from a property owner to the tenants by being incorporated into the cost of monthly rent for individual housing units. Ultimately, every residential household unit in Orange County is expected to pay the same amount of money for access to public recycling service.

Orange County’s current payment structure and recycling service model aims to provide the same level of access to public recycling service for every household as well. The SWPF funds single-family curbside recycling, multifamily recycling, commercial recycling, drop-off sites (open to the public), electronics recycling, hazardous waste collections, education and outreach, enforcement and environmental support. As of 2016, every single-family household and multifamily household is eligible to receive recycling service contracted through or directly provided by the municipality. While 100% of single-family residents have access to public recycling services, it is estimated that approximately 80% of multifamily residents do. The reason for this difference is that some property managers have chosen to abstain from using the public recycling service that is paid for through the SWPF, instead hiring a private hauler to collect their recyclables. Property managers cite various reasons for opting-out of public service, primarily stating that they are unwilling or unable to accommodate the proper recycling receptacles for public collection.

The City of Durham relies on property taxes rather than fees to fund public recycling service. According to an interview with the City of Durham’s Solid Waste Department, 6.29 cents were allocated to the solid waste department’s budget for every \$1 of property taxes

collected from Durham's residents last year. Any landlord, business, or homeowner that pays city taxes is thus expected to financially contribute to public recycling efforts in an amount proportional to the value of the property they own.

Similar to the single-family residences in Orange County, 100% of the single-family residences in the City of Durham have access to public recycling services. Per the requirements specified in Chapter 58 of the Durham, NC Code of Ordinances, residential complexes with more than four units are required to use privately serviced stationary container facilities. Since the City of Durham currently does not service these properties, residents of multifamily properties with 5 or more units are ineligible to receive public recycling service. While residents of multifamily properties with 5 or more units cannot receive recycling service through the city, their property managers are required by law to provide sufficient recycling services to their residents by hiring a private hauler to do so.

Previous research suggests that the cost of contracting private recycling service would be transferred from property owners to residents through a raise in rent (Schwartz, 2018). In Durham and in other cities where taxes are the primary source of recycling funding, landlords and property owners of multifamily housing have raised concerns that they are ineligible to take advantage of a public service for which they are paying. This sentiment is not isolated to recycling and multifamily property owners – it is important to point out that property owners without children may raise similar complaints that their property taxes fund educational services that they may not directly use. The comparison to public funding for educational services is similar in that both programs can be argued to improve the wellbeing of the general community, however they differ in respect to the fact that Durham requires its multifamily residents to pay twice for recycling services where families have the ability to choose to pay twice for their

education by attending a private school.

CHAPTER V. RECOMMENDATIONS AND CONCLUSION

Research Findings and Initial Research Questions

This study's research findings are strongly related to the initial research questions: "How effective are existing municipal recycling mandates for providing access to recycling services to residents of multifamily properties?" and "How do different payment structures used to fund multifamily recycling services distribute costs amongst residents of single-family and multifamily properties? Is this cost distribution perceived as fair?" The analysis of municipal recycling mandates found that the majority of municipal recycling mandates that affected residents of multifamily properties proved to be ineffective by at least one of the three standards for measuring access to recycling services—particularly capacity and convenience stipulations. While many of the mandates did contain stipulations that were related to these three standards, very few of them provided specific wording that could be enforced. When the convenience, capacity, or compliance agent stipulations were specific, they varied widely and appeared to be rather arbitrarily chosen standards.

The case study comparing the payment structures used to fund multifamily recycling services in Orange County, North Carolina and the City of Durham, North Carolina outlined two examples of payment structures that initially distributed costs equally to residents of single-family and multifamily properties but did not always offer the same quality of municipal recycling services to residents of single-family and multifamily properties. In Durham, residents of multifamily properties were legally required to not only pay for municipal recycling services that they were ineligible to receive, but also for the recycling services provided by a private hauler so as to achieve compliance with the city's mandatory recycling ordinance passed in 1994. Orange County's municipal recycling services were offered uniformly to single-family and

multifamily residents, however there was a handful of multifamily properties that had refrained from using municipal recycling services and hired a private hauler to do so instead. Residents of Orange County have been relatively pleased with the payment structure with only occasional complaints whereas the City of Durham has regularly received criticism from representatives of multifamily property management who express concern and annoyance that their properties are unable to receive the municipal recycling services that they pay into through taxes. Both payment structures require its constituents to financially contribute to municipal recycling services irrespective of that constituents' desire to have or use such a service. The mandatory system of payment to fund recycling services was not addressed as a politically controversial aspect of the payment structures in either city, however, this may be a product of the region's being accustomed with mandatory payment structures for recycling in the past and/or the political leanings of the area.

Generalizability of Findings

The scope of this study was very limited and its findings should not be considered representative of municipal recycling mandates or payment structures used to fund multifamily recycling services across the country. By only assessing the municipal codes of the 100 largest municipalities in the United States, it can be reasonably suspected that the codes overstate the true proportion of municipalities that have municipal ordinances that require recycling services to be provided at multifamily properties. The 100 largest municipalities are not scattered randomly across the United States, but instead are concentrated in densely-populated coastal regions of the country which tend to have more liberal political leanings. Only two instances were included as part of the case study on payment structures, Orange County and the City of Durham, which are both located in central North Carolina and share many similar demographic

and political trends.

Additionally, it is possible that there were errors when scanning and interpreting the stipulations laid out by the municipal ordinances regarding the three standards for measuring access to recycling services at multifamily properties. Only the reasonably pertinent sections of the municipal code were scanned for language indicating a stipulation; it is possible that the standards for required recycling services may have been buried in a less obvious section of the code and overlooked when conducting this analysis. Because of the imperfect and unexhaustive nature of this research, the results laid out in the fourth chapter are not intended to deliver conclusive results on the best practices for providing access to recycling service at multifamily properties and distributing costs to fund those services, but rather to expand upon the current understanding of multifamily recycling requirements and their effectiveness as well as payment structures used to fund multifamily recycling services and the fairness of their cost distribution.

Policy Implications and Suggestions for Future Research

Despite many states and municipalities having enacted recycling mandates that require recycling services to be made directly available to residents of multifamily properties, residents of multifamily properties continue to experience lower levels of access to recycling services. In order for these policies to be more effective for providing access to recycling services to residents of multifamily properties, they must include specific stipulations for the convenience of recycling services available to residents of multifamily properties, the container capacity of recycling collection receptacles at multifamily properties, and the agent designated for compliance with the recycling mandate's requirements. Rather than simply following trends in legislation or selecting arbitrary standards, future research needs to be conducted to determine data-driven, realistic management practices for operating recycling collection services at

multifamily properties. When establishing payment structures for municipal recycling services, governments ought to consider the level of access to recycling services that is provided through their programs and how it reflects the distribution of costs used to fund multifamily recycling services.

The key takeaway from this study's findings is that further research is absolutely crucial to be able to design more effective policies for better providing access to recycling service at multifamily properties. Several credible research studies have been conducted to confirm the amount of container capacity that is needed to effectively provide access to recycling services for a single-family property. No such research exists for multifamily properties, an illuminating factor for explaining the wide variation in capacity stipulations that were recorded in the fourth chapter. A research study ought to be carried out to measure the average volume of recyclables that are generated by a typical multifamily property unit so that future ordinances can provide reasonable stipulations for collection capacity.

Secondly, the trend of legislation and current literature on recycling indicates that the best measure of convenience is to have recycling collection receptacles should be located as near as possible to function as similarly as possible to trash collection receptacles. Since limitations of physical property space pose as one of the largest barriers to convenient location of recycling service, states and municipalities have largely begun to turn to municipal building code requirements that mandate all new or majorly renovated multifamily properties to reserve a designated recycling service area on-site of the property. While these policies have proven effective in creating space at new or majorly renovated multifamily properties, the issue of limited space still persists at older properties. Funding research on innovative, new methods of recycling and trash collection could provide the solution that multifamily properties need—

whether it be new containers that are designed to occupy less ground space, containers that can be easily transported to and from a central location for collection, or a different method of collection (such as valet recycling) that would eliminate the need for the storage of any large receptacles at all.

Finally, this research helps to reiterate and prove the key role that property management (or a similar third party) plays in achieving compliance with multifamily recycling mandates; however, future research should focus more heavily on the specific responsibilities that are attached to the role of a compliance agent regarding multifamily recycling mandates. Many state and municipal recycling leaders indicated that they struggle to work with property management in order to improve the level of access to recycling services that residents of multifamily properties experience. By investigating and compiling a list of best management practices for working with multifamily property management on recycling service implementation, future researchers can help government recycling programs feel more equipped to ensure that residents of multifamily properties are receiving adequate levels of access to recycling services—whether the recycling services are provided directly through the municipality itself or contracted out to a private hauler.

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APPENDIX A. INTERVIEW QUESTIONNAIRE

STRATEGIES OF PAYING FOR SINGLE-FAMILY AND MULTIFAMILY RECYCLING

Single-Family Recycling

1. Paying for Single-Family Recycling Service
 - a. Who pays for recycling service at single-family residences in your city/county?
 - b. In what form is the payment made? (tax, fee, general funds, etc.)
 - c. How much are they paying?
2. Providing Single-Family Recycling Service
 - a. Who provides single-family recycling service? (private company vs. public program)
 - b. Who is responsible for arranging for that recycling service?
 - c. How is the recycling service provided (opt-in, opt-out, universal/automatic, etc.)?
3. Legislation for Single-Family Recycling Service
 - a. Is there city/county legislation that affects single-family recycling? If yes...
 - i. Please describe the existing city/county legislation.
 - ii. Is it enforced?
 1. Who is responsible for the enforcement?
 2. How is it enforced?
 - iii. Who, if anyone, is exempt from this legislation?
4. Evaluation of Single-Family Recycling Service
 - a. About what percentage of citizens living in single-family residences have access to recycling service? (please differentiate between drop-off and on-site)
 - b. How would you describe the quality of recycling service that most citizens living in single-family residences have access to?
 - i. Please explain the factors that affect this quality of service.
5. Who Has Access to Single-Family Recycling Service vs. Who Pays for It
 - a. Are there citizens living in single-family residences that pay for recycling service but do not have access to it? If yes...
 - i. Who are they?
 - ii. What barriers prevent them from receiving service?
 - b. Are there citizens living in single-family residences that do **not** pay for recycling service, but do have access to it? If yes...
 - i. Who are they?
 - ii. Who is paying for that service? How are they paying?
 - iii. Why are these citizens not paying?
6. Who Has Access to Single-Family Recycling Service vs. Who Wants It
 - a. Are there citizens living in single-family residences who do not have access to recycling service but wish they did? If yes...
 - i. Who are they?

- ii. What barriers prevent them from receiving service?
 - b. Are there citizens living in single-family residences who do have access to recycling service but wish they did **not**? If yes...
 - i. Who are they?
 - ii. What barriers prevent them from discontinuing their service?
7. Evaluation of the Current Payment Structure for Single-Family Recycling
- a. How cost-efficient is the current payment structure for...
 - i. The municipality and/or private haulers?
 - ii. Single-family residents?
 - b. Is the current payment structure effective for providing widespread access to recycling service?
 - c. Have you received any feedback from residents about this system of payment? If yes...
 - i. Please describe overall themes of the feedback.
 - ii. Who is most pleased with this structure of payment?
 - iii. Who is least pleased with this structure of payment?
8. Additional Comments/Thoughts/Suggestions about Single-Family Recycling
- a. Please elaborate and explain.

Multifamily Recycling

9. Background
- a. How does your city/county define a multifamily residence?
 For the purpose of this study, a multifamily residence refers to a residential complex with 5 or more separate housing units (typically renter-occupied).
10. Paying for Multifamily Recycling Service
- a. Who pays for recycling service at multifamily residences in your city/county?
 - b. In what form is the payment made? (tax, fee, general funds, etc.)
 - c. How much are they paying?
11. Providing Multifamily Recycling Service
- a. Who provides multifamily recycling service? (private company vs. public program)
 - b. Who is responsible for arranging for that recycling service?
 - c. How is the recycling service provided (opt-in, opt-out, universal/automatic, etc.)?
12. Legislation for Multifamily Recycling Service
- a. Is there city/county legislation that affects multifamily recycling? If yes...
 - i. Please describe the existing city/county legislation.
 - ii. Is it enforced?
 - 1. Who is responsible for the enforcement?
 - 2. How is it enforced?
 - iii. Who, if anyone, is exempt from this legislation?

13. Evaluation of Multifamily Recycling Service
 - a. About what percentage of citizens living in multifamily residences have access to recycling service? (please differentiate between drop-off and on-site)
 - b. How would you describe the quality of recycling service that most citizens living in multifamily residences have access to?
 - i. Please explain the factors that affect this quality of service.
14. Who Has Access to Multifamily Recycling Service vs. Who Pays for It
 - a. Are there citizens living in multifamily residences that pay for recycling service but do not have access to it? If yes...
 - i. Who are they?
 - ii. What barriers prevent them from receiving service?
 - b. Are there citizens living in multifamily residences that do **not** pay for recycling service, but do have access to it? If yes...
 - i. Who are they?
 - ii. Who is paying for that service? How are they paying?
 - iii. Why are these citizens not paying?
15. Who Has Access to Multifamily Recycling Service vs. Who Wants It
 - a. Are there citizens living in multifamily residences who do not have access to recycling service but wish they did? If yes...
 - i. Who are they?
 - ii. What barriers prevent them from receiving service?
 - b. Are there citizens living in multifamily residences who do have access to recycling service but wish they did **not**? If yes...
 - i. Who are they?
 - ii. What barriers prevent them from discontinuing their service?
16. Evaluation of the Current Payment Structure for Multifamily Recycling
 - a. How cost-efficient is the current payment structure for...
 - i. The municipality and/or private haulers?
 - ii. Property managers and/or multifamily residents?
 - b. Is the current payment structure effective for providing widespread access to recycling service?
 - c. Have you received any feedback from residents and/or property managers about this system of payment? If yes...
 - i. Please describe overall themes of the feedback.
 - ii. Who is most pleased with this structure of payment?
 - iii. Who is least pleased with this structure of payment?
17. Additional Comments/Thoughts/Suggestions about Multifamily Recycling
 - a. Please elaborate and explain.