# ABSTRACT

Title of Document: TRASH: A LOCAL SOLUTION TO A GLOBAL PROBLEM

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Waste management is a major concern for our world today. Landfills are unsustainable and have serious environmental, social, and economic consequences. To address the issue of waste, cities must design and implement sustainable waste management practices. Our research focuses on the city of Hyattsville, Maryland and the pilot program implemented in January 2010. We used a mixed methods approach to assess the effectiveness of Hyattsville's pilot program in reducing waste, promoting recycling, and changing residents' attitudes towards waste management. We also explored whether trash output is related to income level. Based on data collected on waste and recycling, we found that the pilot program was effective in reducing waste but had no effect on recycling and trash output does not seem to be correlated with income level. Based on an analysis of data from surveys, focus groups, and interviews, we conclude that residents are generally satisfied with the pilot program, but the program can be improved. We provide recommendations for the city of Hyattsville to increase the efficacy of the pilot program.

# TRASH: A LOCAL SOLUTION TO A GLOBAL PROBLEM

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## The Problem of Magnitude: There is a lot of trash out there

### Trash is a global problem

Trash is a global problem. "The world throws away more than 2 billion tons of garbage every year" according to Martin Medina, waste consumption expert with the World Bank, who further notes that "though recycling rates are at historic highs, trash heaps are piling up" (Medina, 2008). Regardless of where you look in the world, countries are facing the growing problem of trash. Figure 1.1 shows the top ten countries that produce the most municipal waste per kilogram per person per year, with the United States on top along with Australia, Denmark, Switzerland and Canada. (Nation Master, 2002).

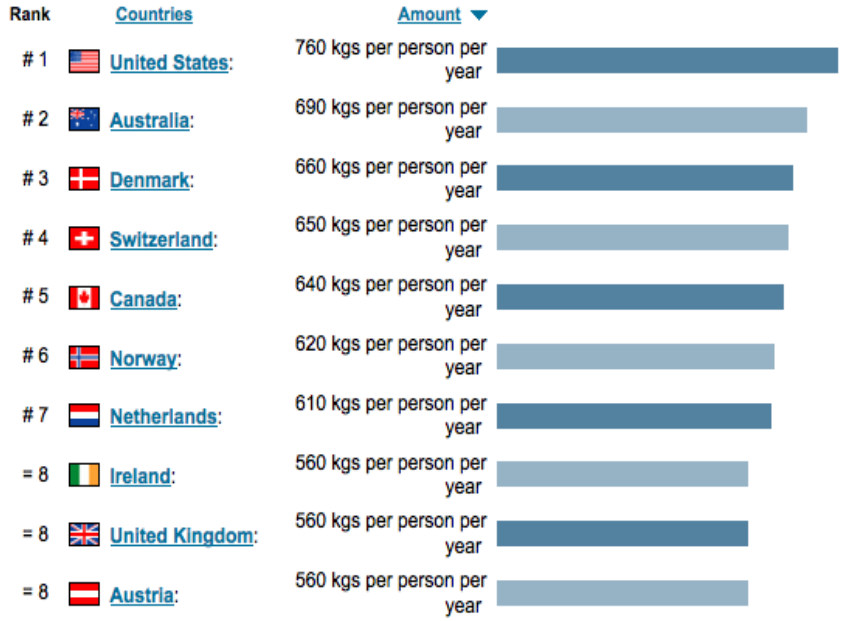


**Figure 1.1 Top Ten Countries that Produce the Most Trash (kg per person per year) (Nation Master, 2002)**

The European Union has faced the problem of running out of landfill space since 1995. Some member countries are now dumping trash into Hamburg, Germany, where a top-notch recycling program and low-polluting incinerators have recently been implemented (Grist, 2008). One such country includes Italy, whose densely- populated city of Naples is named the top city to produce the most trash according to Time magazine reports (Quinton, 2010). However, European nations are not the only ones that face this issue. Many other countries are facing the same struggles as Italy. Similar to the European nations mentioned earlier, countries such China, India, and Australia face the same issue of excessive garbage waste and poor disposal solutions. In the past two decades, the amount of paper, plastic and other garbage has tripled to about three hundred millions tons a year (Zhang, 2010). Other governments are facing similar problems. India's increase in population has caused uncontrollable trash problems in the past decade. Cities in India are under threat of being overwhelmed with trash that is created everyday (Nayak, 2009).

When one looks initially at trash and waste management issues, it appears to be an individual problem. A person may expect it to only affect the specific country, government, and people in question. Many may question, what does trash accumulation in India, China or even Italy have to do with Americans? The reality of the issue is that trash accumulation and improper waste management is a global issue, which leads to environmental consequences that we face as a planet. Waste management is related to environmental quality and climate control (World Bank, 2008) As "standard" household trash such as paper, food, and other biodegradable materials break down in landfills, a large amount of methane gas is released into the environment. The dangers of methane

gas are large, including the ability to lock in 70% more heat than carbon dioxide itself (World Bank, 2008). This accumulation of methane gas causes climate changes and is a cause for global warming (U.S Environmental Protection Agency, 2011).

Additional mediators aside from fossil fuels and "standard" household trash came about in the twenty-first century. In the era of changing technology and innovations, electronics are now deemed dispensable. The concern is that these electronics are building up in landfills and leaking toxins. Electronic waste known as e-waste, is composed of cell phones, printers, computers and photocopies that are found in landfills. This e-waste leaks toxins such as mercury, lead, arsenic and cadmium into the ground (Congressional Research Service, 2010). The dangers of these toxins are deadly. One gram of mercury can contaminate four billion liters of water. Along with Australia, the amount of e-waste is building up in every country including India, China, and especially in the United States. In part, the environmental hazards can be traced not only to the organic material being thrown away but also to our growing use of electronics. As a result, it would appear that our landfills are not only filling up, but also becoming more hazardous to our health. Some nations have started to respond to this problem. For example, the Australian government requires companies that produce electronics goods to provide a means for their customers to properly dispose of and collect unwanted electronics.

Trash is a global problem and the United States has not escaped this crisis. In fact, the United States is ranked number one for producing the world's greatest amount of municipal waste. Medina (2008) found that the richest countries in the world produced the most trash, producing approximately 3.1 pounds of trash per capita/per day compared

to low-income countries, which produce approximately 1.3 pounds of trash per capita/per day. As figure 1.2 shows that low-income countries produce only a little more than half the amount of trash that high-income countries produce (in million tons of trash). Even within a country, levels of socio-economic status can be predicted from the contents of a trashcan. If one opens a trashcan in a wealthy community, he or she is more likely to find food packaging- paper, plastic, wrappers, and even electronics. However, in lower income communities, there will be more remains of inedible vegetables and fruits (Medina, 2008).

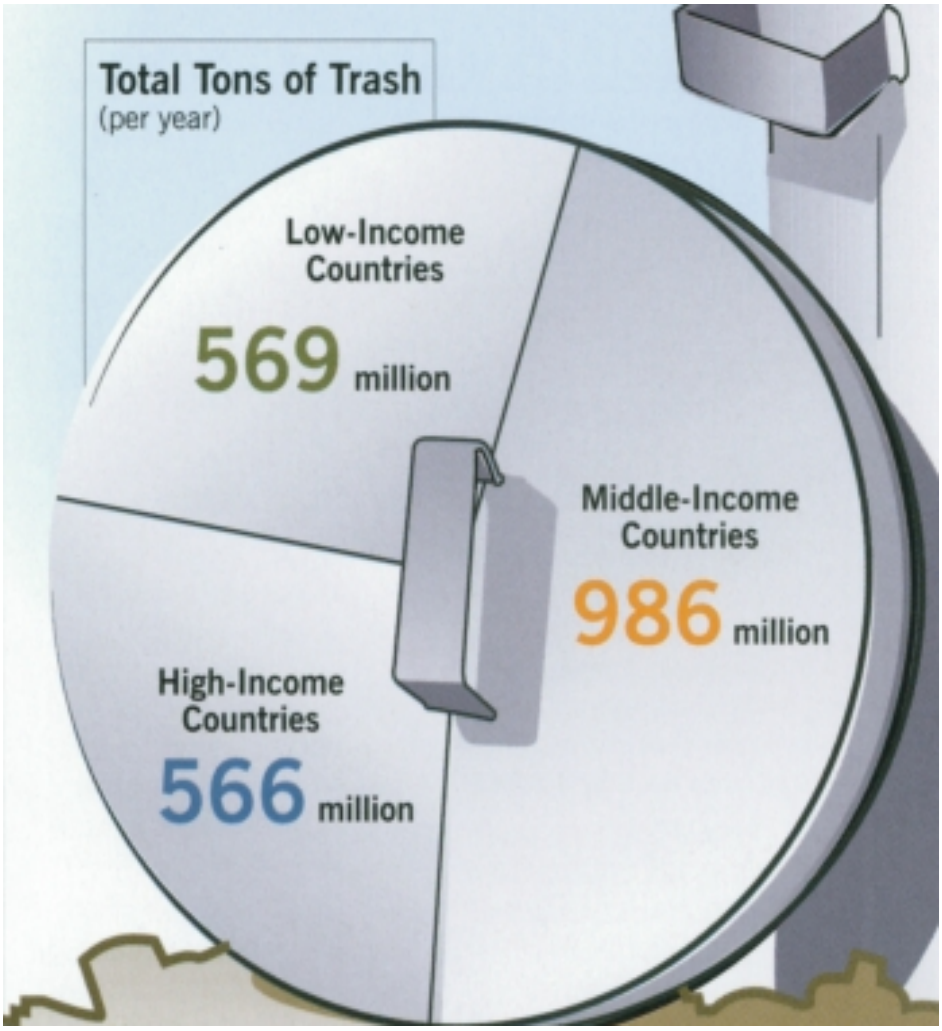

**Figure 1.2 the amount of trash produced by different income-level countries in million tons of trash (Medina, 2008)**

So what puts the United States at the top of the list for producing the most trash? Every year the United States generates approximately 230 million tons of trash. That is 760 kilograms of municipal waste per person per year, which translates to about 4.6 pounds per person per day (Nation Master, 2002). Less than one-fourth of this trash is incinerated or burned. More than 70% of the trash that is thrown into the landfills can be reused or recycled (U.S. Environmental Protection Agency, 2012). Each year the United States Environmental Protection Agency (EPA), produces a report on municipal solid waste (MSW) generation, recycling, and disposal. Figure 1.3, shows the rates of Municipal Solid Waste generation in the United States from 1960 to 2010. As seen in the figure, in 2010, Americans produced about 250 million tons of MSW, or about 4.43 pounds of waste per person per day (U.S. Environmental Protection Agency, 2012). If we put all of the solid waste collected in the U.S. in a line of average garbage trucks, that line of trucks could cross the country, extending from New York City to Los Angeles, more than 100 times (American Solid Waste Industry, 2011).

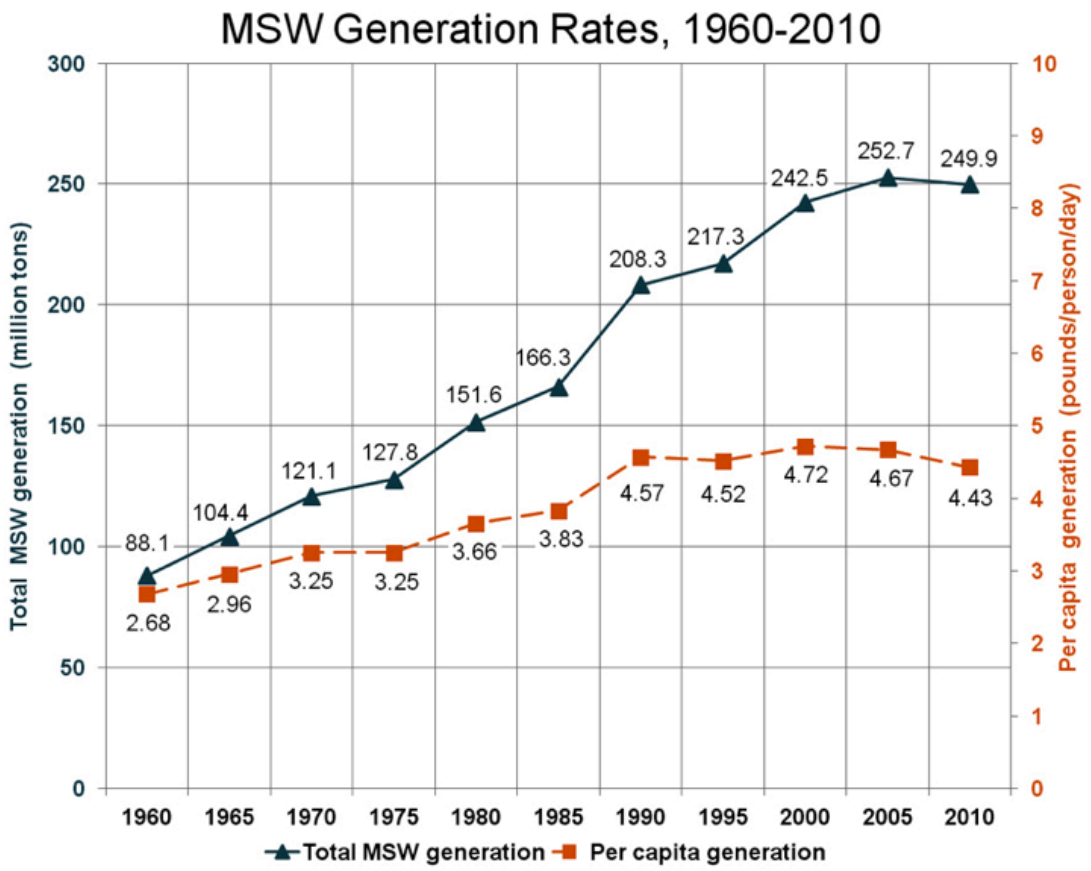


**Figure 1.3 Rate of municipal solid waste (MSW) generate in the United States**

According to the EPA, in 2010 the municipal solid waste, commonly known as trash or waste, was disposed of in three different tactics, including landfill, recovery and combustion. The first and most inefficient was simple disposal into landfills. About 54.3% of trash was discarded in this manner. Around 34% of trash fit under the recovery category, which included reuse and recycling. Only a mere 11.7% of trash was combusted to create energy (U.S. Environmental Protection Agency, 2012).

Inefficiency in recycling has caused landfills to overfill and the government is now forced to close down many landfills and find space to build new ones.

In America, as trash continues to grow trash from one city has to be transferred to various cities around the country (Quinton, 2010). We accumulate such an enormous amount of

trash per year that aside from the Great Wall of China, the only other manmade creation that can be viewed from space is the Fresh Kills Landfill in New York (Environmental News Service, 2001). The Fresh Kills landfill site on Staten Island, New York, used to overflow with trash from various parts of the state. In 2001, after receiving immense pressure from local residents and the United States EPA, the landfill was forced to close. Now the trash from New York is sent to other landfills in Virginia and South Carolina (Quinton, 2010).

The effects of overfilled landfills surpass the issue of lack of space, and include many environmental consequences. According to the United States EPA, there are two reasons to close a landfill. The first is if it is full and the second is if it begins to contaminate the groundwater (American Solid Waste Industry, 2011). Landfills pollute the air around surrounding them, affecting the people who live near them. Studies show that those that reside near landfills have increased risk for certain types of cancer and the release of pollutant has shown to directly correlate with a decrease in immune system function (Pate, 2011). Another issue that has brutal consequences is the leaking of toxins from landfills.

Aside from the public health risks caused by landfills, the economic costs to this global problem are numerous. It is very costly to create and maintain a landfill as well as to fuel trucks to pick up and drop of garbage to and from its respected locations (Recovered Energy, Inc.).

**Recycling: An Alternative to Landfill**

States are now relying on individual cities to put more emphasis on recycling. They believe that a change in trash reduction and recycling will have to occur within small communities first in order for it to have the greatest impact. Garbage pile-ups in landfills come from many different locations such as homes, office buildings, and schools. Cities are now striving to work towards a Zero Waste goal. Zero Waste involves reducing as much trash as possible via reducing, reusing and recycling, to reach a level of 100% of trash being distributed into these three categories and 0% of trash ending up piled in landfills. In 2007, the city of San Francisco mandated its residents to recycle and therefore recycled 71% of its trash, becoming the first major city to work towards Zero Waste (City of Austin).

Recently, cities around the world have been working to increase recycling by changing individuals' behaviors towards waste management. The city of Hyattsville, Maryland implemented their Trash Reduction Pilot Program in 2010 in hopes of establishing a more economically and environmentally friendly method to trash collection. Under the Trash Reduction Program, weekly trash pickups would be reduced from twice a week to once per week. Hyattsville is home to approximately 17,557 persons and there are 6, 324 occupied households (U.S. Census, 2010) .The goal of the pilot program was threefold: (1) to help make the city of Hyattsville a greener place and (2) to reduce trash collection costs and (3) reduce landfill costs. According to DPW Director Patrick Ryan, prior to the implementation of the Pilot Program in 2009, the city picked up over 405 tons of garbage from the months of January to September of that year (personal interview). Recent studies show that with only 37% of Prince George's county

residents are recycling, suggesting that the city may have a long way to go before reaching zero percent waste (Environmental Finance Center, 2008).

The Hyattsville Pilot Trash Collection Program is designed to be a local solution to a global problem. Specifically, in 2010, the city of Hyattsville decided to change the frequency of its trash collection from twice a week to once a week. The justifications for this change in weekly pick up were threefold. First and most importantly, with a reduction in trash, the cost of trash collection would be reduced. Since the number of trucks needed to collect trash would be reduced, and costs of operation and maintenance would be reduced as well, labor and vehicle emission costs would decline. According to the Department of Public Works 2010 proposed budget, it was projected that the city could initially save $231,559 a year and up to $398,664 a year ("Once"). The Department of Public Works also argued that the savings due to the program could be used for street sweeping, graffiti removal, street and facilities maintenance, free mulch, litter collection, and having cleaner parks and public areas ("Public"). Second, the Pilot Program would curb the city's trash output. Since pickups would be reduced people would now have to recycle the trash, which would be accumulated in their home. Finally, with the amount of trash reduced, the cost of removing trash to landfills would also be reduced. Needless to say, the decision was not without controversy. Critics noted that less frequent trash collections would result in more litter in the streets. Less frequent trash collections would result in an unhealthy environment as trash accumulated in both homes and neighborhoods. The Pilot Program began in January 2010 and extended throughout the calendar year. In 2011, the Pilot Program became a permanent city policy.

Though the once a week trash pickup program is now part of city policy, there were several questions that remained unanswered. This study analyzes the effectiveness of the Hyattsville Pilot Trash Program with particular emphasis on its impact on resident recycling behavior. We will do this by employing a mixed method approach to gather both quantitative and qualitative data. With this approach we hope to gain insight into whether the program made an impact in reducing trash and increasing recycling, as well as the effect the program had on the attitudes and beliefs of Hyattsville residents. With the end of this program, we will complement an analysis of changes in trash collected over time between 2009 and 2010, with an analysis of changes in consumer behavior and attitudes regarding trash and recycling. Aside from gathering data from the Department of Public Works regarding trash collected on a weekly basis over a two-year period, we have gathered data on household behavior using online surveys and focus group meetings. We complement this research with in person interviews with people who are directly involved with the design and implementation of the Pilot Trash Program.

The following questions and hypotheses were proposed for the analysis of the year long Pilot Program:

1. Does the new Pilot Program decrease trash production? It is hypothesized that there is no change in volume of trash ($H_o$) or the volume of trash will decrease ($H_1$).

2. Does it increase recycling? It is hypothesized that there is either no change in recycling volume ($H_o$) or there is an increase in recycling volume ($H_1$).

3.Does the Pilot Program change individuals' attitudes on recycling and becoming more environmentally friendly? The attitudes of individuals who are affected by this program

will not change ($H_o$) or residents will be more aware of environment friendly methods of waste removal ($H_1$).

4. Does trash vary by income? Trash does not vary by income level ($H_o$) or trash does vary by income level ($H_1$).

# Chapter 2: Literature Review

## Introduction

Trash is a global problem that requires local solutions. The challenge facing local communities is to how to design and implement an effective strategy appropriate to their local circumstances. A review of the literature about this issue highlights efforts to address, "Trash, a global problem," on an international, national, and local scale.

We begin by describing landfills and incinerators, short-term strategies to the problem of waste. These solutions are not sustainable and pose threats to public health. We continue with an analysis of recycling, or the "conversion of waste into useful material" (Waite, 1995). Recycling is a more sustainable solution to waste. Studies have shown that effective recycling programs rely heavily on citizen participation and economic incentives. We then discuss reuse and reduction, sustainable solutions to waste. The most innovative and intriguing solution to the problem of waste is the Zero Waste Initiative. Zero Waste is a system that involves reduction, reuse, and recycling. Its ultimate mission is for 100% of waste to be reused or recycled and for 0% of waste to end up in landfills or incinerators. Zero Waste initiatives have been successful in San Francisco, California. We follow with a discussion about the impact of financial resources on environmental behaviors. We conclude by examining the relevance of past research to our study in Hyattsville, Maryland.

## Landfills

Landfills are one short-term solution to the problem of waste. Currently, about 80 percent of our nation's garbage goes to landfills (Annenberg Foundation 1). Contrary to popular belief, a landfill is different from a dump or an open hole where trash is buried. A landfill is an engineered structure, built in or above the ground, to separate trash from the surrounding environment. A landfill is designed to contain waste so that it is not released into the environment through groundwater, air, or rain (Freudenrich, 2011).

For a landfill to be designated as "sanitary", it must meet four conditions. First, the landfill must isolate leachate, or the liquid material that drains from stockpiled waste, from the surrounding environment. Notably, a soil or synthetic liner is not sufficient to ensure adherence to this sanitary requirement. Rather, a comprehensive system of leachate collection must be in place to insure all liquid matter is collected. Second, the landfill design must be engineered based on local geological investigations, and the landfill must develop a waste disposal plan. Third, the entire landfill process must be controlled at all times. Trained staff need to supervise construction, operation, and maintenance of the landfill. Finally, a landfill must be designed to spread waste in layers and have a means to compact their waste. This will minimize the amount of waste left uncovered, and thus limit accessibility to pests and other animals. If a landfill does not meet any of these four criteria (1) adequate leachate collection; (2) a waste disposal plan; (3) supervision; (4) adequate design, it is not designated as a sanitary landfill (Thurgood 2).

The problem with unsanitary landfills is that waste can be released into the atmosphere by the air, groundwater, or rain. Methane gas and carbon dioxide naturally form in landfills as the waste decomposes. When the gases form, pressure inside the

landfill builds up. This pressure can result in movement of the gas, which can lead to an eventual release of gas into the surrounding environment. According to the Environmental Protection Agency, the production of methane gas from landfills is a contributor to the current global warming crisis. Other landfill gases, such as benzene and perchloroethylne, can also cause complications, such as breathing difficulties, nausea, headaches, and central nervous system problems, if inhaled at certain concentrations.

In addition, unsanitary landfills allow toxins, which are full of organic and inorganic pollutants, to leak into the soil and contaminate the surrounding ground water. Leachate, the liquid containing these toxins, contains heavy metals and endocrine-disrupting chemicals that can be harmful to the human body if consumed.

Maintaining a comprehensive system of leachate collection is difficult. A faulty liner doesn't block leachate from interacting with the soil and faulty leachate pipes don't collect all leachate from the landfill. Aside from this, an even greater environmental concern is that landfill linings will ultimately fail due to natural deterioration. These linings are nearly impossible to replace. According to Leak Location Services (2000), "82% of surveyed landfill cells had leaks while 41% had a leak area of more than 1 square feet." The high probability of failure of landfills in the long-term can be seen by the experiences in the international community.

**International Experience**

Landfills are now a serious concern all over the world. . In China there is a landfill in Zhengzhou, a city with a population of over 7 million. The landfill is closed off from local residents by only a small fence. The landfill pollutes the surrounding

environment, rotting the fruits on trees and drawing insects around the homes. Many residents of Zhengzhou were diagnosed with bronchitis and many other health complications that are related to the fumes created by landfills. The Chinese government is now trying to implement new incinerators, which they claim will reduce the amount of trash build up. Unfortunately, incineration creates its own environmental problems, including the production of toxic fumes that can contribute to global warming. In the city of Beijing, with a population of over 17 million, there are over 200 legal and illegal landfills. The city waste expert, Wang Weiping, predicts "All landfill and treatment sites in Beijing will be full in four years." He concludes that "It's necessary to restructure the current disposal system. We cannot rely on landfills anymore. It's a waste of space" (Buczynski 1).

In India, with a population of 1.2 billion, it is estimated that waste generated could be as much as 1.3 pounds per person per day (Look, 2009). As a result, India generates 27 million more tons of waste than the U.S. per year. Unfortunately, it has only one third of the land space of the United States, and consequently faces the challenge of finding safe locations for disposal. As a result, it is not surprising that trash is often found to be thrown into any abandoned land and rarely is there a predesigned treatment or waste management plan (Look, 2009). It is estimated that up to 90% of trash in India is dumped by environmentally unsound methods. According to a 2008 report by the World Bank, if an efficient waste management system were in place, approximately 15 percent of India's waste materials such as paper, plastic, metal, and galls could be recovered and recycled. In addition, if methods can be developed to recover the organic waste, the amount of waste sent to the landfill would be significantly reduced. Notably,

the government has implemented a solution, which may not be considered drastic enough. This method, known as waste-to-energy (WtE), reduces the physical size of waste and uses it to generate electricity. This new method is more efficient than composting because it is known to reduce the volume of waste by 60-90% and reduce the amount of greenhouse gas emissions (Look, 2009). Unfortunately, it may not be enough to solve India's problem.

**National Experience**

According to the U.S. Environmental Protection Agency, Americans generate trash at a shocking rate of 4.6 pounds per day per person or 769 kgs per person per year. America throws away almost twice as much as trash per person as most other countries. This rate translates to 251 million tons of waste thrown away in America every year. Although some of this material will be recycled, reused, or burned, the majority of this trash will end up in a landfill (Freudenrich, 2011).

The Garbage Barge was one of the first media attractions to bring light onto trash problems and became an eye-opening event for United States. In 1983, Long Island, New York passed a law requiring the closing and phasing out of all landfills (Conover). Instead, resource-recovery plants were used for waste managements. These garbage incinerators burned trash and used this energy to generate electricity. By 1987, however, Long Island was running out of room for their trash. It was decided that 3,100 tons of garbage would ship from New York Harbor to a southern landfill where it could drop off its shipment. Instead, the barge remained in the ocean for three months. The Garbage Barge sailed from port to port around the east coast, and was never allowed to stay and

unload. The ship roamed the sea for six months before its contents were brought back to Brooklyn, to be burned in the incinerator and buried as if it had never left New York. This media spectacle led states to establish some kind of municipal recycling program to control trash in their states (Conover).

A study by the New York State Department of Health (1998) sought to determine if living near a landfill increased the risk of developing cancer. The researchers examined the rates of seven types of cancer in men and women living near 38 landfills throughout the state. The results were statistically significant for bladder cancer and leukemia in females. Women living inside the rings of these landfills were four times more likely to develop these cancers than women living outside the rings of these landfills. The study thus demonstrates that living near a landfill poses significant health risks.

**Local Experience**

With a population of an estimated 5.6 million residents, each year the state of Maryland produces enough trash to build a wall, three feet wide and six feet tall that is 4,287 miles long. That is approximately the distance from Washington D.C. to Anchorage, Alaska. The majority of this waste will end up in a landfill.

The Brown Station Road Sanitary landfill is located in Upper Marlboro, Maryland and collects all municipal solid waste for Prince George's County. According to Waste and Recycling News (2008), it is the largest in the State of Maryland. According to the Prince George's County Department of Environmental Waste Management, the facility takes in nearly 2,000 tons of waste per day.

Notably, Darryl Flick, Assistant Director of the Brown Station Road landfill, supports the landfill's use of modern technologies in disposal, gas collection, energy recovery, and leachate treatment. He feels that if correctly managed and designed many of the environmental hazards associated with the landfill can be mitigated. (personal interviews)

**Recycling**

Recycling has been offered as an alternative to landfills as the primary waste management practice Waite (1995) defines recycling as "the conversion of waste (discarded material with no worth) into a useful material (resource with an economic value)". Recycling is a solution to the buildup of waste that benefits the environment and the economy. For example, recycling paper is advantageous for the environment, as recycling just one ton of paper saves seventeen trees. Recycling is also now shown as cost efficient solution to this garbage overflow because there is high potential for materials that are thrown away to be recycled. For example, the thirty six billion aluminum cans that were found in the landfills last year had a scrap value of more than six hundred million dollars.

A 2005 study by the Environmental Protection Agency (EPA) reports that "Americans generated an average of 4.5 pounds of garbage per person per day in 2005. About 1.5 pounds were recycled, resulting in a national recycling rate for municipal solid waste of just 32%." According to the Maryland Department of the Environment, Maryland recycles 41% of its waste, significantly higher than the national average, but significantly lower than the 72% achieved in San Francisco.

In 2010, the Environmental Finance Center conducted a review of Prince George's County Waste Management. The total solid waste budget for the County is approximately $100 million with an estimated $30 million of that for collecting trash and $7 million for recycling collection. The Environmental Finance Committee's (EFC) analysis was deigned to provide Prince George's County the information necessary to develop short- and long-term goals in each of the categories of waste management discussed. The EFC's analysis indicated that overall Prince George's County is managing trash programs and prioritizing waste management issues within the County at a relatively successful level. The EFC's overarching recommendation was to focus attention on the waste management areas that offered the greatest potential amount of waste diversion areas, such as construction and demolition waste, food waste composting, electronic waste, and recycling efforts at County schools, businesses, and multi-family dwelling facilities.

Recycling is not mandatory in Prince George's County, but the county's recycling program has been marginally successful. The County has managed to maintain a 37% recycling rate, which is slightly above the national average of 32.5%, but below the State average of 41%. This is likely to climb even higher as the County has chosen to use a more efficient single-stream recycling process. This single- stream system allows for all household recyclable material to be placed into the same collection container, a 65-gallon wheeled cart to be provided to citizens at no charge. It is expected that simplifying the recycling process and eliminating the need to sort materials will result in higher participation from County citizens and a recovery of up to 30% more recyclable materials than the conventional system.

The EPA reports that 38% of American's waste is plastic and another 18% of our waste is paper. These figures highlight the opportunity for additional recycling efforts. In this light, researchers have attempted to learn more about recycling as an individual behavior and community behavior. To increase the amount of recycling, we must first determine why individuals recycle and how recycling can be promoted for entire communities.

Hopper and Nielsen (1991) have concluded that individuals are more likely to recycle when they are encouraged by neighbors, specifically a "block leader" responsible for reminding residents to recycle and setting a positive example for recycling. Recycling is an altruistic behavior in that individuals are more likely to recycle when recycling fulfills personal norms, social norms, and social expectations. (Hopper and Nielsen, 1991)

States are now relying on individual cities to put more emphasis on recycling. These governments believe that a change in trash reduction and recycling will have to occur within small communities first, in order for it to have the greatest impact. To promote recycling for entire communities, studies have demonstrated the effectiveness of door-to-door programs, educational campaigns, community forums, and community websites.

Door-to-door outreach programs can be very effective in promoting recycling. In the "Recycling Roadshow" in the United Kingdom, volunteers went door to door to encourage residents to "reduce, re-use, recycle" (Read, 1990). This intervention method proved to be cost effective and helped increase the recycling pickup of the borough from 107 tons to 132 tons. The author concluded that the main reason for residents not

recycling was a lack of awareness. Similarly, in an educational campaign in Jaslo City, Poland, volunteers or home advisors went door-to-door in an effort to educate and inform as many residents as possible. The home advisors attempted to convince non-recyclers to recycle, distributed leaflets, posters and booklets on local waste management services, and answered any questions about local waste management services. In addition, they surveyed the residents and found that reasons for not recycling included "do not produce enough waste to segregate (35%), lack of time (29%), storage space or lack of interest, and cannot be bothered (25%)" (Grodzinska-Jurak, 2006). Notably, the researchers found that the amount of recycling and number of inhabitants participating in the program increased significantly after the implementation of the educational campaign.

A 1995 study by Carl Obermiller addresses the issue of environmental communication appeals. Obermiller wanted to determine whether it was better to use a "sick baby" approach or a "well baby" approach to educate the public and socially market environmental issues. The "sick baby" appeal focuses on the problem itself and its severity, but often discourages people from actually believing they can make a positive change. The "well baby" appeal is an "affirmation of the individual's action and its potential for significant effect." The author concluded that there is no one method that is most effective overall. The method that was superior to educate the public really depended on the specific environmental issue being discussed. For energy conservation and solid waste reduction, the sick baby appeal seemed to be more effective. The well baby appeal performed better for issues of water conservation and recycling. In terms of environmental issues, it depends on the specific issue being addressed that determined

whether it is more beneficial to take a sick baby or a well baby approach. Neither of these approaches are necessarily superior overall.

Folz et al. (1991) analyzed recycling programs throughout the United States and found that educational campaigns and community forums were the most effective. The educational and public awareness techniques most widely used were pamphlets, brochures, and bumper stickers, speeches by officials to schools or local groups about recycling, special educational programs about recycling in the public schools, free newspaper public service notices, and paid newspaper advertisements. The study also found that the main incentives used in these programs were official recognition of recycling efforts and contests with prizes. Ultimately, the success of recycling programs depended on the level of public participation and whether or not the citizens felt that they were involved in the process. The results highlighted the importance of community forums among neighborhood groups and local school to democratize the process of collecting recyclables (Folz, 1991). This conclusion was reiterated in a study by Monica Nyamwange (1996) that concluded that public education programs must consistently inform residents on the mechanics of recycling. Both television programs and newspaper advertisements are important in reaching different target audiences (Nyamwange, 1996).

Community websites have also been found to be useful tools in informing community residents of waste collection services and promoting recycling. In a comparison of face-to-face and internet mobilization, Hooghe and his colleagues (2008) found that the internet was more effective in mobilizing attitudes and face-to-face was more effective in gaining participants (Hooghe et al., 2009).

Needless to say, the success of these community outreach efforts relies heavily on promoting citizen participation. Ultimately, any local strategy relies on the "buy in" by the local residents. The 2007 study by the California Integrated Waste Management Board (CIWMB) highlights the importance of citizen participation for the success of trash reduction oriented programs. The city found that a comprehensive outreach and education program improved program effectiveness by engaging the public. The program was considered a success, reducing trash service by 60 cubic yards per week, saving trash collection fees, and seeing an average monthly recycling growth rate of 6.3 percent ("Innovations").

In a separate study, Ballard (2008) addressed the notion of citizen participation in local meetings and found that encouraging participation resulted in the people taking on more responsibility in the community. Although the study concerned political involvement, it still emphasized the importance of citizen participation and stressed that any program requires resident knowledge and input. Folz (1991) did a comparison study on how different cities designed their waste recycling programs in order to find common themes that led to the most effective programs. The study found that the most effective programs tended to have the highest rates of citizen participation and that the cities with the highest participation implemented information and education strategies that involved meetings with and speeches to neighborhood groups and local schools.

The importance of outreach and participation in any trash reduction effort is clear. What is not clear is how best to design outreach programs that will promote participation. In large part the design will depend on the current attitudes and behaviors of the

residents. In this light, it becomes important to understand how best to identify such perceptions.

The need to document individual values and beliefs regarding the environment reflect current environmental research that emphasizes the significance of surveys and focus groups to better understand how residents think about recycling, trash and the environment. In addition, this approach is deemed necessary to reliably determine how attitudes and behaviors vary different segments of the population. .

Mark Cordano, Irene Hanson Frieze, and Kimberly Ellis (2004) researched the attitudes of different environmental stakeholders. They hypothesized that attitudes play an important role in motivating the behaviors of individuals with different stakeholder motivation. In this light, Cordano and colleagues surveyed business managers, regulators, and members of environmental protection agencies. The results showed that the groups differed in terms of their support of balancing property rights against government restrictions. (Cordano, et al , 2004) and highlighted how different backgrounds can result in different attitudes toward the environment and result in different behaviors.

In a similar vein, Granzin and Olsen (1991), found that environmental attitudes are correlated with environmental behaviors. Their basic premise is that in order to change recycling behavior either by personal choice or by law regulation, individuals need a clear understanding of why it is important and what needs to be done. The challenge lies in individual preferences and that not all people share the same passion and concern for the environment. As such, to make changes in consumer behavior, a segmented approach is desirable and policies need to be targeted to individual preferences and concerns. The authors conclude that participation in environmental

programs can be better understood in terms of personal values and when aspects of helping behavior are understood.

Notably, there have been a lack of environmental studies that have relied upon focus groups. Anna Davies (1999) has noted that though they can be an effective methodological tool in environmental policy, cases have been difficult to find. She concludes that until recently, land-use planning has largely ignored the potential helpfulness of focus groups on research until. To further complicate the problem is that focus groups are often incorrectly used. She observes that focus group facilitators often fail to establish a dialogue between themselves and the group to help inform the participants about the subject matter.

Davies concludes that focus groups are not used enough in the environmental sector and have been shown to have little impact on policy only because of their scarcity. There are problems with quantitative environmental values surveys, but these gaps can be filled by the rich information gained from focus groups. The diversity of the public is now more emphasized in policy and the public and academics need to collaborate more than ever.

**Waste Reduction**

Another long-term solution to waste is reduction. To reduce the amount of trash generated, localities can use a command and control approach or an economically efficient approach. In other words, cities can strictly enforce waste reduction or encourage residents to recycle through alternative means. In 2000, government officials in Vancouver required each citizen to reduce their trash production by 50%. They also

implemented programs to pick up glass, paper, metal, and plastics from homes to be reprocessed. The study concluded that, since recycling only takes back 5-7% of the total waste, the best solution is to encourage people to create less waste (Maclean, 88).

In recent years, city officials have passed legislation to reduce the use of plastic bags by consumers. Plastic bags are an environmental concern because they are not biodegradable and are often littered. Plastic bags are not only an eyesore in our parks, but also a threat to the environment. According to the Environmental Protection Agency, plastic bags are one type of marine debris that directly impacts the environment. Plastic bags are harmful to aquatic animals such as turtles that mistake these bags for food. (EPA 2)

To reduce the use of plastic bags, the District of Columbia implemented a 5-cent bag tax for all stores that sell food or alcohol in January 2010 (Hill 1). The tax was designed to raise $3.5 million to clean up the Anacostia River by the end of 2010. The tax resulted in a clear reduction in plastic bags in the Anacostia River. An environmental group, during their 2010 annual cleanup, picked up a third of the amount of plastic bags that they collected in 2009. Though the tax benefitted the District's environment, the tax is still a controversial issue for District residents. First, the tax fell short of its estimated revenue in 2010. The tax only generated $2 million to help clean up the Anacostia River. In addition, some consumers argue that it is an annoyance to bring reusable bags to the store, especially when they are relying on public transportation (Associated Press 1-3)

In January 2011, Montgomery County, Maryland followed the example set by the District and issued a 5-cent tax on plastic bags. The tax is similar to the bag tax in the District, but covers a wider range of stores. So far, the tax appears to be effective. In the

first 16 months, the tax has generated $2.6 million (Hill 2). Revenues collected from the bag tax go to the county's Water Quality protection fund and pays for "litter cleanup, steam restoration, and runoff prevention" (Hill 2). A plan to institute the bag tax in Prince George's County, Maryland is currently underway and awaiting approval from the House and Senate (Hill 1).

An economic solution may lie in transferring the cost of trash collection directly to the consumer (or generator of trash), resulting in less trash generated. One example is Alameda County, California where residents are charged $8 per pound of trash generated. According to the Alameda County Waste Management Recycling, the waste charge serves as a type of recycling subsidy by encouraging people to recycle certain materials rather than pay for throwing them away.

The "pay as you throw" system was also implemented in Marietta, Georgia. Researchers George Hutven and Glenn Morris examined the results and implications of a unit-pricing demonstration project in Marietta. The project required residents to pay by the unit for waste disposal services. The city experimented with a bag and subscription can program as the two different methods for a unit-pricing system. Both the bag and the can programs were successful in reducing the amount of solid waste collected and landfilled by the city of Marietta. $550 per day in avoided costs for Marietta if all households had participated in the bag program. $241 per day in avoided costs for Marietta if all households had participated in a can program. The analysis of household set-outs under the unit-pricing programs also indicates that the programs increase the rate of household participation in the recycling program. This increased participation averages to an additional 0.19 lbs of recycled materials. Illegal dumping, including littering and

unauthorized use of dumpsters, does not necessarily increase with the decrease of household waste output (Hutven & Morris 536-53).

Alternatively, localities may simply make it more difficult to throw out trash. There is mounting evidence that conversions from twice-weekly to one-a-week collection programs have the capability to contribute to a reduction in the amount of solid waste by increasing the incidence of recycling. Informed largely by a similar transition in the city of Dallas, Texas, the "Office" learned that Dallas experienced a rise in recyclable materials after adopting the once-a-week collection program. In one neighborhood, Kiestwood, the impact was so great as to amount to a 437% increase, from 8 pounds of recyclables per household to 35 pounds. Interviews with the Assistant Sanitation Director in Dallas affirmed the success of the switch in amplifying the amount of recyclables collected (City of Hyattsville, 2009).

In San Jose, California, a 2007 study conducted by the California Integrated Waste Management Board (CIWMB) implemented a new recycling program in 72 city facilities that substituted each employee's 5-gallon trashcan with a 3.5-quart mini trashcan to discourage the disposal of recyclable materials. Besides the growth to 1,200 tons of recyclable materials collected, the program also saved $11,000 in trash collection fees ("Innovations"). Studies of this nature support the intentions of a conversion from twice-weekly to once-a-week trash collection. Our work will add to the body of knowledge as to whether this approach can be an effective local strategy to reduce trash and increase recycling**.**

**Zero Waste Initiative**

Local municipalities have engaged in variety of programs to address their growing trash problem in effort to minimize costs and save the environment. Perhaps the most extreme lies with the Zero Waste Initiative. The Zero Waste International Alliance (2004) defines Zero Waste as "a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use." Zero Waste involves reducing as much trash as possible via reducing, reusing and recycling, to reach a level of 100% of trash being distributed into these three categories and 0% of trash ending up piled in landfills.

A Zero Waste community is a community where everything that could be thrown away is instead put to some other use. The goal of Zero Waste is propelled by desire to save money, grass roots activism, and hopes of appearing green. Some of the methods employed to help the cities reach Zero Waste include using advanced recycling technologies, and composting food and selling it as nutrient rich fertilizers (Gunther, 2007).

Cities are now striving to develop Zero Waste projects. San Francisco is a model for achieving Zero Waste. A 2009 report on San Francisco's recycling initiative notes that San Francisco has achieved a 72% recycling rate, the highest in the U.S., and has plans to increase that number to 100% by 2020. The major push for Zero Waste comes from businesses and residences dedicated to the idea of recycling. Additionally, all major construction projects are required to recycle materials. According to the city's environmental department, two thirds of what is in the San Francisco landfills can be

recycled, including 40% compostable, 15% paper, and 15% other materials. San Francisco Environment Director Jared Blumenfeld explains, "If we captured everything going to landfill that could have been recycled or composted, we'd have a 90% recycling rate. City officials are considering making recycling and composting mandatory."

Zero Waste is also currently being attempted in San Antonio, Texas and Atlanta, Georgia. In San Antonio, solid waste experts hope to eliminate landfill use in the city within the next ten years (Gonzalez, 1). One goal of their Zero Waste initiative is to promote composting, as organic materials make up one-fifth of waste that ends up in the city's landfills. Along with a trash and recycling bin, residents will have a separate bin for food and another for green waste. San Antonio also designed a 10 Year Recycling and Resource Plan, aimed to increase the city's recycling rate to 60% in the next decade.

Downtown Atlanta plans to become the first Zero Waste Zone in the Southeast area. The Environmental Protection Agency defines a Zero Waste Zone as an area "designed to reduce the impact of waste in homes, workplaces, and in the community". The first goal of Atlanta's project is to compost the hundreds of thousands tons of waste from the convention district that would otherwise go into the landfill. For example, the Hyatts Regency Atlanta now composts an estimated 928,000 pounds of residual food product. This food waste is then collected to create organic compost to be used by local farmers and gardeners (Brown, 2009).

In addition, many businesses, including Wal-Mart, Toyota, and Nike, are also trying to achieve Zero Waste. Wal-Mart sells its old hangers for 15-25 cents a pound to Mountain Valley Recycling, a Tennessee company that turns them into pellets of resin to be made into plastics.

The lesson to be learned is that everyone needs to be involved in order to get to a 72% recycling rate like San Francisco, and it is initiated and mandated by the government with the citizens being willing participants.

**Financial Resources**

There is strong evidence that people of low socioeconomic status are disproportionately affected by environmental problems. For example, Norton and colleagues (2007) tested the existence of an environmental injustice that is related to race and socioeconomic status and the location of solid waste facilities in North Carolina. They concluded that the solid waste facilities could in fact be harmful to an individual and community's health. They also determined that solid waste facilities were disproportionately located in communities of color and low wealth (Norton et al 1344-350).

Evidence also suggests that attitudes and behaviors toward the environment vary in terms of economic status. Thus, though one may realize that environmental revitalization would positively change their lives, they may have limited resources to affect costly solutions (Lee, 2002).

In 2006, two neighborhoods in Mexico City, varying in socioeconomic strata were examined in terms of trash generation (Lubell, 2009). The two neighborhoods, Magdalena Mixiuhca and Jardin Bulbuena Sur, were chosen because of their similarities in the localization and management of solid waste and differences in the minimum wage of employed workers. The total quantity of Inorganic Urban Solid Waste (IUSW), the composition of IUSW (plastic, paper, cardboard, metal, glass, and fabric), and the

quantity of IUSW for each day of the week was measured. The neighborhood with the higher income level (Jardin Bukbuena Sur) generated more IUSW than the neighborhood with the lower income level (Magdalna Mixiucha).

In a more global context, it has been perceived that those nations with higher income levels exhibit more environmental concern than nations of lower income. The levels of affluence that differ between high income and low-income communities influence this distinction. Nations with higher income levels were more likely to agree on spending more on environmental protection (Dunlap, 1995).

**Local Solutions**

Though changing attitudes is a critical part to reducing trash generation, localities have more proactive options. An economic solution may lie in transferring the cost of trash collection directly to the consumer (or generator of trash), resulting in less trash generated. One example is Alameda County, California where residents are charged $8 per pound of trash generated. According to the Alameda County Waste Management Recycling, the waste charge serves as a type of recycling subsidy by encouraging people to recycle certain materials rather than pay for throwing them away (lAlameda County, 2012).

Alternatively, localities may simply make it more difficult to throw out trash. There is mounting evidence that conversions from twice-weekly to one-a-week collection programs have the capability to contribute to a reduction in the amount of solid waste by increasing the incidence of recycling. Informed largely by a similar transition in the city of Dallas, Texas, the “Office” learned that Dallas experienced a rise in recyclable

materials after adopting its program. In one neighborhood, Kiestwood, the impact was so great as to amount to a 437% increase, from 8 pounds of recyclables per household to 35 pounds. Interviews with the Assistant Sanitation Director in Dallas affirmed the success of the switch in amplifying the amount of recyclables collected (City of Hyattsville, 2009).

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**Conclusion**

The global problem of trash requires a local solution. It requires a collaborative effort of both the public and private sector. A review of the literature emphasizes that we can address the problem of trash with landfills, recycling, and reduction. It is clear that landfills and incineration are not a viable solution. Local governments have to pursue consumer-based solutions in order to encourage consumers to generate less trash and increase the amount they recycle.

The focus of our study is Hyattsville, MD, and evaluating a local solution to a global problem. Our study aims to evaluate the city of Hyattsville's solution to the

problem of trash. In 2010, the city of Hyattsville implemented the Pilot Trash Pickup Program. This program changed trash collection from twice-weekly to once-a-week. The officials of Hyattsville implemented this program because they believe its will result in a reduction trash output, either due to a decrease in consumption or to an increase in reliance on recycling. By reducing the frequency of the trash pickup, the city hoped to save money, reduce the volume of trash and encourage people to recycle.

We hypothesize that, with the transition from twice to once weekly collections, trash volume will decline, recycling volume will increase, residents will be more aware of the trash issue, and trash generated will vary by income level.

# Chapter 3: Methodology

## Introduction to Methodology

Our study is based on a mixed method approach that integrates both qualitative and quantitative methodological approaches. The mixed method approach is a third paradigm in academic research. It is an approach that values the usefulness of both qualitative and quantitative research. Drawing from the strengths of both of the traditional orientations, mixed methodology minimizes the weaknesses across and within research studies. At its core, a mixed method approach is useful because it allows for a narrative to add meaning to numbers and conversely provides an empirical context for individual observations. Expanding the confines of a single approach, researchers can answer a broader range of questions. By using a mixed method approach, we were not limited to any one specific type of data and we were able to draw on the benefits that combining the two approaches can provide. The mixed method also allows for a convergence of or triangulation of findings, adding insight that may be missing from an individual method. Corroborating methodologies can increase the generalization ability of the results to other situations. . A mixed method approach was deemed most appropriate given our attempt to understand citizen attitudes towards trash collection while also examining changes in actual trash tonnage collected changed before and after the implementation of the pilot program. The qualitative portion of our research consisted of a focus group with local residents and expert interviews with people knowledgeable about trash collection in the city. Both approaches allowed us to gain richer insight into attitudes about trash and the environment, and finally, attitudes about the Pilot Trash Program. The quantitative portion of our research included surveys, both online and in

person, was designed to allow us to better understand the values, beliefs and behaviors of residents in Hyattsville, MD as it relates to the environment, local policies to address the global problem of trash. These policies range from the national initiatives such as the Zero Waste Program, to the more local initiative recently implemented in the city of Hyattsville to reduce trash collection from twice a week to once a week. The wide range of questions would also provide us with a broad understanding of the waste disposal habits of the citizens of Hyattsville. To provide a context to better understand our results, we conducted an analysis of the change in garbage collected before and during the Pilot Trash Program.

**The Study Area**

The city of Hyattsville is an incorporated city in Prince George's County, Maryland located approximately 8 miles northeast of Washington D.C. People generate trash, and therefore the size of the population and number of households in a city affects the amount of trash generate. As noted in Table 3.1, below, the 2010 Census reported Hyattsville as a city with a population of 17,557, including 6,324 households with an average household size of 2.73. Notably, one and two person households comprise more than 50% of the households (57.7%) in the city, while an additional 12.4% of the households have at least 4 people generating trash.

**Table 3.1. Distribution of Households by Persons per Household**

| | | |
|---|---|---|
| Total Households | 6324 | 100% |
| 1 person | 1960 | 31.0% |
| 2 person | 1691 | 26.7 |
| 3 person | 956 | 15.1 |
| 4 person | 746 | 11.8 |
| 5 person | 455 | 7.2 |
| 6 person | 234 | 3.7 |
| 7 person | 282 | 4.5 |
| U.S. Census Bureau. Households and Families: 2010. 2010 Census Summary file 1, Table QT-P11. | | |

Rental properties use or pay for their own private trash collection, and as such were not part of the garbage collection data provided by the Department of Public Works. Notably, this would not affect our analysis of change in garbage collected, before and during the Pilot Program. In contrast, homeowners rely on city services for their trash collection. In our case, we were able to collect and analyze the trash generated from the latter group as compiled by the Department of Public Works. . The 2010 Census reported that there were 6,324 housing units, of which the 3,033 owner occupied units represent 48.0% or less than half the units in the city.

Hyattsville is a diverse community. Based on our literature review, it was hypothesized that differences in values, beliefs and attitudes regarding trash and the

environment might be a reflection of socioeconomic characteristics such as race, income and education.

**Table 3.2. Distribution of Population by Race and Ethnicity**

| | | |
|---|---|---|
| Total | 17557 | 100% |
| White alone, Non-Hispanic | 4206 | 24.0 |
| Black or African American alone, Non-Hispanic | 6076 | 34.6 |
| Asian Alone, Non-Hispanic | 757 | 4.3 |
| Other alone, Non-Hispanic | 147 | .8 |
| Two or more, Non-Hispanic | 399 | 2.3 |
| Hispanic | 5972 | 34.0 |
| U.S. Census. Profile of General Population and Housing Characteristics:2010. 2010 Demographic Profile Data. Table DP-1. | | |

As noted in Table 2, above, the 2010 Census reported that more than a third of the residents (34%) were of Hispanic origin, while an additional 35% of residents were African American. White residents comprised less than a quarter of the Hyattsville's total population. The median household income in the city in 2010 was estimated to be $54839, which was less than the county's media. In terms of educational attainment, the city is diverse, with more than a third of those 18 to 24 years of age without a high school diploma, well above the county average, while the percentage of college graduates of 15% exceeded the county average of 9.7%.

**Table 3.3. Educational Attainment and Median Income**

| | Prince George's County | City of Hyattsville |
|---|---|---|
| Less than High School Graduate (Persons 18 to 24) | 15.4% | 34.1 |
| Bachelor's degree or higher (Persons 18 to 24) | 9.7 | 15.3 |
| Median Household Income | 71260 | 54839 |
| U.S. Census. Educational Attainment. 2006-2010 American Community Survey 5 Year Estimates. Table S1501<br>U.S. Census. Selected Economic Characteristics. 2006-2010 American Community Survey 5 – Year Estimates. Table DP03 | | |

## Quantitative Analysis

### *Section 1: Trash and Recycling Data*

*Trash Collection*

The Department of Public Works is responsible for collecting trash in the City of Hyattsville. It limits its collection to single family homes, and explicitly excludes apartment buildings, institutions and commercial businesses. These entities rely on private trash collection. The Department allocates its 8 trucks to different routes to ensure complete coverage of city households. Each truck has 3 workers: a driver and two workers on the back collecting trash from either side of the street.

In 2009, trash collection occurred twice week. Depending on where you were on the route, collection would occur on Monday and Thursday or on a Tuesday and Friday. With the implementation of the 2010 Pilot Trash Program, each household would have their trash collected once per week. The specific day of the week would determine the specific trash collection route and the homes where trash would be collected. Notably, on Fridays, two separate neighborhoods have their trash collected (see appendix).

The Department of Public Works provides weekly summaries of the trash collected by the specific route. In addition, it provides the cost of removing the trash to the local landfill. In essence this cost represents landfill charges and is directly related to the amount of trash delivered or dumped. The reported costs do not include the operating and maintenance costs associated with collecting data.

Notably, between 2009 and 2010, the specific truck routes changed (See Maps,) but are still comparable. Instead of sending all the trucks to cover the city in 2 days twice a week, the trucks are sent to each different area on different days only once a week. By separating the data into which truck covered which route in 2009 and applying that to the routes by day in 2010, we were able to compare changes in trash generation over time by truck routes. We also can aggregate the total trash collection for the city and compare that over time.

*Recycling Collection*

Recycling data was obtained from the Prince George's County Waste Management Group for 2009 and 2010 on a monthly basis. Recycling represents all materials that households have placed in their "blue" recycling buckets. Notably, recycling collection is not a responsibility of the city's Department of Public Works,

rather, it is collected by the county. This difference had one immediate impact on the research. Since recycling is not collected by the Department of Public Works, it is not possible to correlate recycling collections with specific trash routes or areas of Hyattsville. Nonetheless, the Waste Management Group was able to provide monthly summaries of the total recycling collected for the area that included the city of Hyattsville. As such, these recycling data provide a complement to the trash data collected on a city-wide basis.

The Prince George's County Waste Management Group was unable to provide us with a map of the area that covers the city of Hyattsville. As will be noted in the results section, any indication of recycling shown by this data may include a larger area outside of Hyattsville. The data, however, will still be used to illustrate the general recycling habits of the residents in Hyattsville. Further, it should be noted that these estimates of recycling are probably underestimates of total household recycling, since there are restrictions as to what can go in the "blue" buckets, e.g. electronic equipment, hazardous materials, lawn trimmings, etc.

### *Section 2: Examining Trash by Income Level*

As cited in the literature review, income level is an important factor in general waste management knowledge and generally places with a higher level of income produce more trash. Thus, just as the study by Munoz-Caneda (2009) showed more trash produced in a Mexican neighborhood with a higher income than its lower income counterpart, we wanted to see if both trash output and possibly even attitudes about recycling were different based on the income level of the routes in Hyattsville. These

routes effectively served as our neighborhoods, but we could not ascertain median or average income values because the routes are too close physically. Therefore, instead of using income level as our measure of affluence, we gathered average house values based upon the Maryland Department of Assessments & Taxation (see appendix). These average house values represent the value the MD Department of Assessments & Taxation has placed upon a house based upon its size, property size, and upkeep. The average house value can substitute income level assuming that those with more income will most likely have a higher valued house.

To obtain average house values for each the routes, we used the official Hyattsville website, which provides a list of homes located on each route. We then arranged a list of all of the houses on each route, randomized it using excel, and then selected the first 75 of each to search within the MD Department of Assessments & Taxation database. Each route has around 800-900 houses on it, so 75 provides a large enough sample for accurate results. If the house value of any house on the list was not available, it was skipped and replaced by the next house on the excel list.

### ***Section 3: The Survey***

*The Survey Instrument (Appendix B)*

The survey instrument focused on ascertaining opinions and attitudes of Hyattsville residents. It was administered primarily online, but the basic questions also provided the basis for our expert interviews as well as focus group questions. As such, it provided a common benchmark against which we could compare information gathered from different sources.

*Basis for the Survey Instrument*

Based on a review of the literature, we designed a close-ended questionnaire which we administered in person to Hyattsville citizens. In addition, we made the questionnaire available for online responses. Our questions focused on resident awareness and views of global and local environmental issues, their opinions on the importance of recycling and the Zero Waste initiative, as well as their personal opinions about the effectives and necessity of the switch to once a week trash collection. As a result, we were able to learn about their attitudes trash collection and recycling, as well as their opinions about the actual trash collection program.

We limited our questionnaire to close ended questions and pre-tested it with a select group of randomly selected respondents. Based on this experience, we revised several questions for clarity. Notably, the pre-test efforts also highlighted the challenge of face to face in person interviews. Despite significant efforts to garner face to face participation in this pre-test phase, it was clear that it would be an untenable activity given our resources. In addition, it soon became clear that the questionnaire was too lengthy to comfortably administer in person

As a result, the revised survey was posted online via "Survey Monkey." We publicized the online survey through various means including personal contact, the GREEN JUSTICE web page, and flyer advertisements. In addition, we asked local community groups to advertise its availability.

*Administering the Survey*

Online surveys have both shortcomings and benefits. The principle shortcoming is the inability to adequately filter out inappropriate respondents or to prevent respondents

from answering the same survey multiple times. In addition, residents without internet access obviously would not be able to participate creating an implicit systematic bias in the responses. Presumably, lack of internet access suggests a lack of resources. Finally, online surveys preclude a personal connection between the surveyor and the respondent. By its very nature, the interviewer is unable to probe or follow-up on answers, and conversely, the respondent is unable to ask for additional clarity of the question. An online survey is very impersonal and restricts our access to richer insight regarding responses we receive.

We felt that these concerns were outweighed by the benefits of using an online approach. It would be more efficient and allow us to reaching a broader audience at a nominal cost. Online surveys are much less expensive than face to face interviews and saves resources in terms of transportation costs and time spent administering the survey in person. In addition, an online survey would allow respondents to complete the questions at their own leisure, and thus allow them to think carefully about their responses. We also thought it would help lead to more honest answers from survey participants, given the anonymity of the process. Finally, the online survey would facilitate the data entry and data analysis stage. Survey Monkey minimized data entry error, in contrast to the recording the results from the in person interviews.

Notably, we continued to administer face to face surveys where possible. However, we would rely on the online survey as the main tool to access resident attitudes, to be complemented with the in person administration of the survey.

The online survey was made available for a five month period from February, 2010 to June, 2010.

People responding to the online survey were limited to adults living in Hyattsville and had trash collected between Tuesday and Friday as trash was not collected in Hyattsville on Mondays. Over that period of time we collected, 73 surveys suitable for analysis.

## Qualitative Analysis

### *Section 1: The Focus Group*

A focus group consists of a small group of participants (8 to 10) engaged in structured discussion about a specific topic. This group is ideally a representative sample of the group of people that the data collected should be applied to.

At its most basic, focus groups are used to collect data in the form of unbiased opinions through facilitated discussion. The discussion is led by group leaders who provide direction towards particular aspects of the topic in order to gain new insight. Traditional surveys that attempt to gain insight often involve a section that incorporates an opinionated response. These traditional surveys are not able to allow for the bidirectional interaction between conflicting and confirming opinions. This interaction occurs during the group environment of focus groups. If conducted properly, opinions will feed off of each other to delve deeper into the concerns of different viewpoints. The achievement of this depth would take many rounds of traditional surveys with participants being informed of previous data before each round of surveys. This method is impractical. Through focus groups, we are able to create an environment in which instant feedback from one viewpoint elicits a response from an opposing or differing

viewpoint. This cycle continues as long as the discussion is kept on the appropriate topic. Constructive feedback during the focus group is something that traditional surveys cannot achieve. Through this process of feedback, our focus group discussion was able cover many aspects of environmental concerns, program awareness, and possible changes while still delving much deeper into each issue than the form of a traditional survey. In our focus group, we led participants through a guided discussion of the Pilot Trash Program. Specifically, we focused on community awareness of the change from twice a week to once a week pickup, possible changes to the program, and general assessments of the effectiveness of the pilot program.

The focus group will complement the quantitative data gathered from surveys as well as the Public Works Department. The focus group approach will allow for participants to build off of each other's experiences and ideas in order to give rich information about Hyattsville's response to the change in trash pickup in particular, and consumer attitudes about trash and the environment in general. Focus groups also allow participants to openly share beliefs, identify disagreements, and sort through their reasons for thinking.

Myers (1998) provided guidance in the actual implementation of our focus group and served as a guidebook to the science of conducting a focus group.

*Recruiting Participants*

The original objective was to gather two groups of participants of six to ten people each. Focus group participants were to reflect the diverse opinions of all Hyattsville residents. To find this group of participants we needed to be creative. While

brainstorming ideas, we thought of faculty members at the University of Maryland and friends who were Hyattsville residents.

For instance, university faculty member, Gail Rumper, was able to give us ideas about how to advertise our focus groups. Our first attempt was advertising in her apartment building. This apartment building would not allow this type of solicitation. We found that there are many obstacles to overcome when advertising effectively for focus groups. These obstacles include finding a location and also presenting the information well. Due to the high level of time commitment in attending a focus group as well as the low willingness of many people to share personal information, it was very hard to actually get participants to commit. Especially when the participants that we want to target are from all income levels.

The main populations that were difficult to bring in were mainly Spanish speaking participants as well as low-income individuals. Advertising as well as coordinating in Spanish was not feasible for our team. It would have given the focus group a different and valuable dynamic, but we were unfortunately unable to attract this demographic.

Low-income participants were difficult to attract due to their high levels of commitment to their employment and families. Disposable time is not very abundant in this demographic. This demographic also is more susceptible to problems arising with transportation. The low-income demographic would have provided us a cost-oriented perspective on the pilot program.

Fortunately, we were able to recruit environmentally involved members in the Hyattsville community and their friends without getting too much of a biased opinion. These participants were easy to recruit due to our previous involvement with them. They

were able to give us their best view on how different diverse niches of the community would respond to certain questions. By attracting focus group participants that had a legitimate stake in the issues at hand, we were able to find fairly unbiased opinions.

Changes can be made to our recruiting process to make it easier to get people to come. Although we tried to recruit focus group participants while administering in-person surveys, this was unsuccessful. If we had kept better touch with those participants that were willing to complete surveys, we would have had more success with bringing in a diverse group of residents to the focus group session. For instance, during the International Hyattsville Street Festival, there were many surveys completed. Along with these surveys, there were many participants who expressed willingness to attend a focus group. As time passed between the festival in early Fall 2010 and the focus group section, it became more difficult to keep in touch with these residents. By the time we were setting our roster in stone, none of the participants who had expressed interest in the focus group were accessible. If we did more in-person surveys closer to the actual focus group date, we may have had more success on capitalizing on these contacts. Additionally, sending frequent emails to these participants would have most likely proved to be beneficial in retaining at least some of these participants.

*Hyattsville Focus Group Design*

The Hyattsville focus group was comprised of six residents from Hyattsville who volunteered to attend. The focus group was designed to provide for a more open dialogue between the researcher and participant, and complement the in-person and online surveys already in progress. Bringing together interested Hyattsville residents in

one setting was deemed an effective way to obtain detailed insights regarding resident concerns and issues as it related to trash and recycling, and other environmental efforts. In addition, the results would provide a tool for gauging (1) the effectiveness of efforts to publicize the pilot Trash program, (2) the awareness of proper environmentally sustainable behaviors, and (3) the sensitivity to awareness of possible goals for future environmental improvement. These results would help identify strategies to promote greater citizen participation in the city's sustainability efforts.

Three methods were used to identify focus group participants. First, during our in person interviews, we asked those who declined to answer the questionnaire whether they would be willing to participate in a focus group. In addition, we publicized the event through different community electronic boards as well as our website. Finally, we asked members of local environmental groups if they knew of people who would be interested in participating. We followed up on all possible participants, and also asked them, if they knew of other potential parties. Clearly, our sampling approach was non-random in nature. Those who ultimately participated in the event were well versed in the issues to be addressed. However, we felt that a richer discussion could be obtained with people knowledgeable and interested in the issue, rather those who would be completely apathetic.

In total, six Hyattsville residents participated in the focus group. All were homeowners and participants in the Pilot Program. Most of the participants were long time residents, two have been residents for between ten and twenty years. Only two had lived in Hyattsville for less than five years. They ranged in age from their early thirties to late fifties. All were fluent in English, and had at least some college education. Our

participants were all active in the community. This group was consistent with the admonishment that homogeneity is important. Homogeneity of the people in a focus group is critical for an open discussion. People are more comfortable and open to discussion if they feel a connection with the other participants (Myers, 1998). We realize that we failed to gather other segments, but we feel that future research will have to develop a means to engage other parts of the community.

*Creating the Script*

Focus groups are not free form discussions, but rather structured discussions following a predefined script. In our case, the online questionnaire provided the basis for the script. The closed ended survey questions were adapted for our focus group to allow for broader and more detailed answers. As result, though the script addressed the same issues as the closed ended questionnaire, respondents had much more flexibility in their responses, and more importantly could take advantage of the group dynamic, and feed off of one another's answers.

In addition to these same issues, the focus group covered in greater depth the Hyattsville Pilot Program. It addressed how the program was publicized and what current thoughts were on its efficiency.

In contrast to the closed ended questions of the survey our focus group script emphasized elaboration on opinions and views. As such, the script asked open ended questions, such as "Why do you think the city implemented this change?"

In addition, we sought to gain more detailed information on specific behaviors and experiences by addressing the motivations for personal changes in trash handling and recycling. We also asked for their perceptions of changes of littering in the street.

The focus group session was held at the Hyattsville City Hall. We chose this site based on it proximity and convenience to the participants, as well as its familiarity to all involved. Food was provided, and the entire session lasted 2 hours, as promised.

***Section 2: Expert Interviews***

*Purpose*

To complement the focus group activity, we conducted personal interviews with individuals directly involved in the Pilot Program's introduction and implementation. These interviews were either conducted face to face or over the phone. The purpose of these interviews was to provide additional insight into the Pilot Program and to gauge its success from the perspective of those actively involved with the issue.

*Participants:*

The people we interviewed included:

- William Gardner, Mayor during the Pilot Program implementation
- Tim Hunt, City Councilman, Ward 3, Votes on continuation of the Program
- Patrick Ryan, Director of Department of Public Works
- Gary Wells, Public Sanitation Truck Driver, first hand observation

These experts were selected to give a comprehensive view of the Pilot Trash Program, and to provide a context to better understand the behavior of Hyattsville residents.

# Chapter 4: Results

**Part A. Quantitative Data**

***Section 1: Trash Output Data***

The focus of this analysis is to determine whether there has been a change in the amount of trash or recycling generated between the two time periods, 2009 and 2010.

The first set of data was the amount of trash and recycling collected in tons throughout the city of Hyattsville. As mentioned before, the recycling data may include areas outside of the city of Hyattsville, so the actual amount recycled in Hyattsville might be lower than reported. Along with the tons of solid waste is the total cost of placing the trash in the landfill. The monthly values and totals are shown below in table 4.1.

| **Month** | **Rec. 09 (tons)** | **Rec. 10 (tons)** | **Trash 09 (tons)** | **Trash 10 (tons)** |
|---|---|---|---|---|
| Jan | 89.4 | 87.65 | 340.93 | 311.19 |
| Feb | 85.44 | 60.72 | 308.24 | 239.73 |
| Mar | 71.23 | 93.41 | 360.98 | 374.38 |
| Apr | 60.14 | 101.53 | 424.5 | 420.91 |
| May | 95.31 | 60.18 | 468.2 | 377.64 |
| Jun | 76.86 | 81.44 | 503.63 | 396.04 |
| Jul | 77.65 | 85.2 | 446.52 | 394 |
| Aug | 82.63 | 89.67 | 424.85 | 388.59 |
| Sep | 81.71 | 100.37 | 404.76 | 371.87 |
| Oct | 94.84 | 56.35 | 366.79 | 343.93 |
| Nov | 59.86 | 70.97 | 392.19 | 363.9 |
| Dec | 78.02 | 88.82 | 383.9 | 329.95 |
| Total | 953.09 | 976.31 | 4825.49 | 4312.13 |
| Trash: Recycling Ratio | | | 5.1 | 4.4 |
| Avg. | 79.42 | 81.36 | 402.12 | 359.34 |
| St Dev | 11.58 | 15.67 | 55.26 | 48.30 |

**Table 4.1. Monthly recycling and trash tonnages for 2009 and 2010 as well as total cost for depositing trash in landfills.**

The results indicate that from 2009 to 2010 there has been a decrease in total trash tonnage of 513.36 tons or a decline of 10.6%, while the tons recycled increased by 23.22 tons or 2.4% from 953.09 to 976.31 tons. This translates in a decline in the monthly average trash collected (from 402 to 359 tons) and conversely, an increase in the average monthly recycling (from 79 to 81 tons).

A comparison of means t-test indicates that the change in means was significant for the decline in total tons of trash with a p-value of 0.0014. The change in means for recycling tonnage, however is not significant at a p-value of 0.39. Further, this trend, can be seen by looking at the trash to recycling ratio for the two periods. As noted in the table above, the ratio has dropped from 5.1 to 4.4 indicating that the amount of trash relative to recycling has decreased. Notably, despite our undercount of total household recycling, it should be noted that the decline in trash generated has been relatively substantial. Specifically, the decline of trash (513 tons) has not been equaled by a commensurate increase in recycling (which increased by only 23 tons). Also, based on the total values from Table 1, it can be seen that 16.5% of all waste was recycled in 2009 while 18.5% of all waste was recycled in 2010 further showing the relative amount of recycling did not increase greatly.

These monthly values for recycling and trash collected can also be seen in figure 4.1.

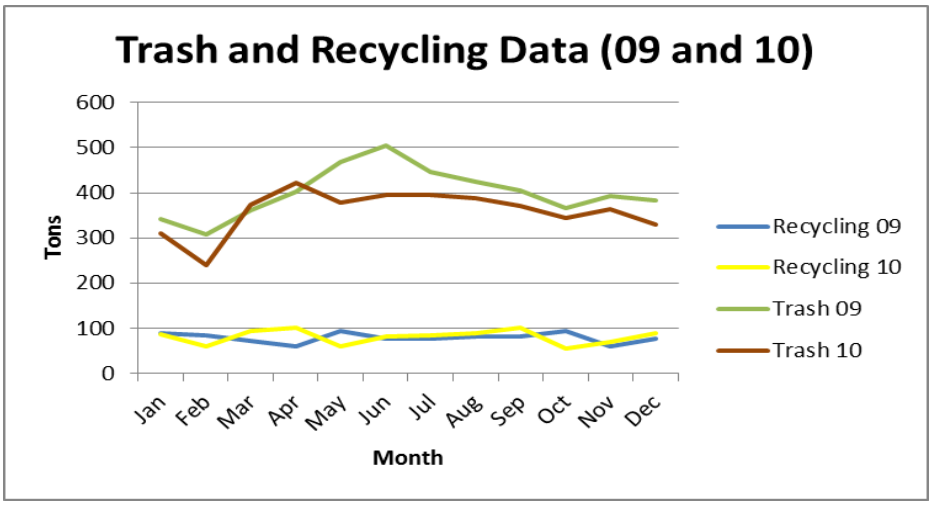



**Figure 4.1. Graph of monthly recycling and trash tonnages for 2009 and 2010.**

Figure 4.1 above summarizes the trend of trash and recycling on a monthly basis. An examination of the data for 2009 and 2010 shows that trash generation is much more volatile than the recycling generated. Trash generation in 2009 peaked in June (503 tons), and was at its lowest in February (308 tons.) The comparable figures for 2010 were a peak in April (420 tons) and February (240 tons) was again the lowest. The amount of trash generated seems to increase in the warmer months.

The range of trash generation for 2009 and 2010 was 195.39 tons, and 181.18 tons, respectively. In contrast, recycling data shows a much more stable trend over periods, not eliciting the highs and lows. The range of recycling per month, in 2009 and 2010 was 35.45 tons, and 45.18 tons, respectively. By graphing these trends, we can see where the greatest differences occurred. Hence, though recycling has been fairly stable, it would appear that trash declines were largest from April to July over the two periods. This period of time would have accounted for much of the observed mismatch between the decline in trash. During this period in 2010, there is also a decrease in the amount of recycling mirroring that of trash.

Table 4.2 below summarizes the trash collections by week for the city for 2009 and 2010. The Prince George's County Waste Management group could not provide us with weekly recycling amounts and instead only gave us a monthly summary.

| Week | Tons 09 | Tons 10 |
|---|---|---|
| Week 1 | 106.51 | 90.1 |
| Week 2 | 80.83 | 71.65 |
| Week 3 | 68.01 | 75.75 |
| Week 4 | 68.62 | 73.68 |
| Week 5 | 76.29 | 61.34 |
| Week 6 | 80.94 | 0 |
| Week 7 | 75.08 | 98.65 |
| Week 8 | 75.93 | 79.79 |
| Week 9 | 68.41 | 74.4 |
| Week 10 | 87.96 | 86.7 |
| Week 11 | 77.22 | 78.31 |
| Week 12 | 81.41 | 91.64 |
| Week 13 | 87.24 | 88.25 |
| Week 14 | 92.59 | 103.53 |
| Week 15 | 108.65 | 95.85 |
| Week 16 | 99.51 | 91.66 |
| Week 17 | 105.01 | 105.21 |
| Week 18 | 104.12 | 88.96 |
| Week 19 | 113.32 | 84.84 |
| Week 20 | 106.64 | 86.74 |
| Week 21 | 121.21 | 96.81 |
| Week 22 | 110.14 | 96.93 |
| Week 23 | 113.08 | 90.35 |
| Week 24 | 110.14 | 84.96 |
| Week 25 | 109.01 | 77.79 |
| Week 26 | 82.07 | 90.83 |
| Week 27 | 135.15 | 68.49 |
| Week 28 | 95.63 | 86.78 |
| Week 29 | 96.81 | 84.8 |
| Week 30 | 98.12 | 87.11 |
| Week 31 | 101.08 | 91.21 |
| Week 32 | 97.18 | 89.22 |
| Week 33 | 93.06 | 92.98 |
| Week 34 | 104.25 | 92.19 |
| Week 35 | 102.96 | 87.47 |
| Week 36 | 99.74 | 88.47 |
| Week 37 | 94.8 | 82.17 |

| | | |
|---|---|---|
| Week 38 | 89.45 | 79.1 |
| Week 39 | 88.59 | 78.52 |
| Week 40 | 70.91 | 83.76 |
| Week 41 | 77.01 | 80.23 |
| Week 42 | 87.82 | 80.1 |
| Week 43 | 89.53 | 78.97 |
| Week 44 | 94.34 | 82.32 |
| Week 45 | 106.29 | 99.72 |
| Week 46 | 92.77 | 78.66 |
| Week 47 | 59.95 | 76.93 |
| Week 48 | 130.37 | 101.53 |
| Week 49 | 78.88 | 71.83 |
| Week 50 | 80.84 | 73.38 |
| Week 51 | 31.15 | 49.59 |
| Week 52 | 103.52 | 59.89 |
| Total | 4810.14 | 4290.14 |
| Average | 92.50 | 82.50 |
| St Dev | 18.19 | 16.01 |

**Table 4.2. Weekly trash tonnages for 2009 and 2010.**

In 2009, the city collected 92.5 tons of trash per week (with a standard deviation of 18.19 tons) and by 2010 the average weekly trash tonnage had dropped to 82.5 (with a standard deviation of 16.) A comparison of means t-test indicates that this difference was significant at a level of 0.00015.

Figure 4.2 shows a comparison of weekly trash collections. It would appear that initially, the difference between the two periods exhibited greater volatility, and then after week 15, 2009 trash collections exceed the 2010 collection amounts. At that point the relationship appears to stabilize with trash collections usually declining from one year to the next. It may be that there was some time needed for people to become accustomed to the new collection cycle.

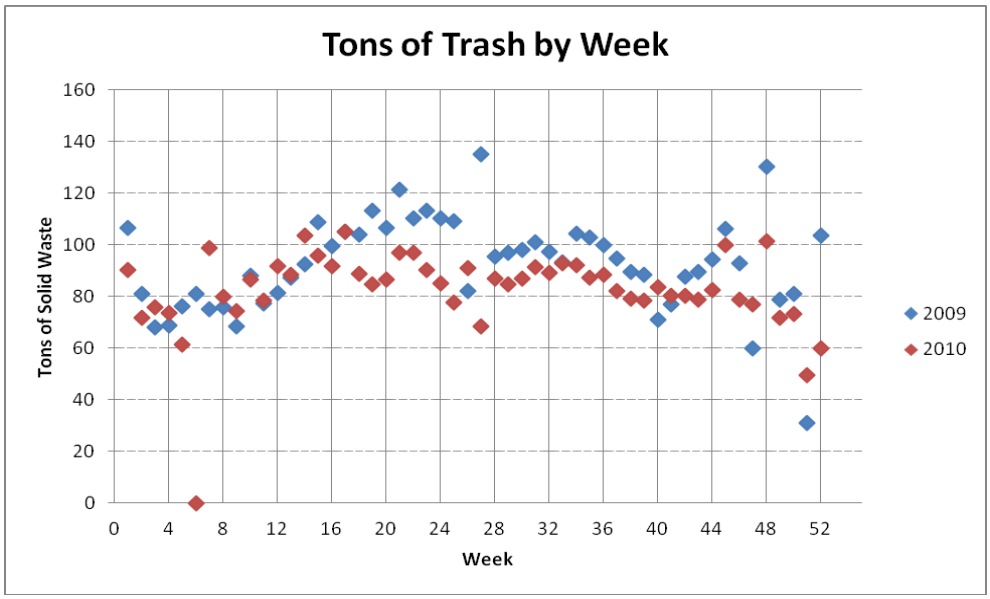



**Figure 4.2. Weekly trash tonnages for 2009 and 2010.** *There was no collection week 6 of 2010, but the point was included so the remaining weekly values match between 2009 and 2010.*

The highest points occurring in 2009 appear directly after major holidays. Week 27 pickup occurred after July 4th, week 48 after thanksgiving, and week 52 after Christmas. The week before these weeks shows low total tonnage and in 2010 these post-holiday weeks show lower totals. The holiday pickup policy seems to have changed following the implementation of the pilot program, but it should be noted that some citizens complained of the new holiday schedule via focus groups and council meetings.

In order to reduce the frequency of collection, the collection routes had to be reconfigured. With a reduction in trash collection frequency, the city's Public Works Department, the agency responsible for trash collection, has reconfigured the eight trash collection routes to ensure full coverage for the city. Fig. F.1 (appendix F) shows the trash routes prior to this change and Fig. F.2 (appendix F) shows the trash routes after the implementation of the new Pilot Program. Using these new trash routes, we calculated the house values to use in our analysis of income and trash production. The average

house values for the Tuesday route is $247,638, for the Wednesday route is $243,979, for the Thursday route is $263,452, and for Friday route is $234,871. Average house values were calculated with the documentation provided by the Maryland Department of Assessments and Taxation.

As seen from the map in the appendix, the 2010 trash routes can be separated further into different areas of the city based upon what day of the week the trash is collected. The data for 2009 can also be separated into these same areas, so that for example the heading 'Tuesday' represents East Hyattsville, 'Wednesday' represents Central Hyattsville, 'Thursday' represents South and Southeast Hyattsville, and 'Friday' represents North and West Hyattsville. To compare the amount of trash produced by each area, the number of houses on each route needs to be factored in. The City of Hyattsville website's list of addresses falling under the new pilot program shows the number of houses in each route:

| Route | # Houses |
|---|---|
| Tuesday | 934 |
| Wednesday | 812 |
| Thursday | 817 |
| Friday | 856 |

**Table 4.3. Number of houses in each route.**

The monthly values by route are shown in table 4.4 below.

| Month | Tues 09 | Wedn 09 | Thurs 09 | Fri 09 | Tues 10 | Wedn 10 | Thurs 10 | Fri 10 |
|---|---|---|---|---|---|---|---|---|
| Jan | 89.21 | 75.44 | 81.33 | 72.86 | 81.93 | 73.90 | 73.61 | 81.74 |
| Feb | 82.38 | 78.37 | 73.38 | 74.11 | 65.09 | 54.94 | 57.44 | 59.72 |
| Mar | 94.85 | 91.61 | 89.33 | 84.60 | 112.42 | 96.72 | 81.04 | 84.20 |
| Apr | 123.18 | 106.80 | 91.21 | 87.45 | 102.58 | 85.44 | 110.42 | 122.47 |
| May | 119.32 | 105.63 | 120.56 | 121.15 | 93.54 | 83.63 | 90.82 | 93.85 |
| Jun | 142.82 | 115.18 | 129.97 | 115.66 | 117.42 | 102.47 | 85.65 | 88.50 |
| Jul | 125.28 | 109.06 | 105.05 | 106.57 | 88.56 | 80.43 | 86.83 | 118.18 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Aug | 117.56 | 113.81 | 97.54 | 95.94 | 100.21 | 81.20 | 85.22 | 98.97 |
| Sep | 108.80 | 90.35 | 100.66 | 104.95 | 108.27 | 97.52 | 100.09 | 88.98 |
| Oct | 98.13 | 97.64 | 93.00 | 78.02 | 83.86 | 75.42 | 78.57 | 106.08 |
| Nov | 114.32 | 90.57 | 86.47 | 72.39 | 68.53 | 35.71 | 39.52 | 43.49 |
| Dec | 72.20 | 69.67 | 107.49 | 90.84 | 55.51 | 85.84 | 96.49 | 92.11 |
| Total | 1288.05 | 1144.13 | 1175.99 | 1104.54 | 1077.92 | 953.22 | 985.70 | 1078.29 |
| **Total/Household** | **1.38** | **1.41** | **1.44** | **1.29** | **1.15** | **1.17** | **1.21** | **1.26** |
| Avg. | 107.34 | 95.34 | 98.00 | 92.05 | 89.83 | 79.44 | 82.14 | 89.86 |
| **Avg./Household (pounds)** | **229.84*** | **234.84*** | **239.90*** | **215.06** | **192.35** | **195.65** | **201.08** | **209.95** |
| St Dev | 20.36 | 15.29 | 16.07 | 16.92 | 19.63 | 18.62 | 18.97 | 22.14 |

**Table 4.4. Tons of trash per month separated by routes in 2009**. ** signifies 2009 value is significantly higher than 2010 counterpart based on t-test. Tuesday p = .0017, Wednesday p = .0091, Thursday p = .0057*

Dividing the average monthly amounts for each route by the number of houses in the route, we found the average monthly amount of trash produced per household to be able to compare the 4 routes. These values are shown below in figure 4.3. The averages for Tuesday, Wednesday, and Thursday routes in 2009 are all significantly higher than in 2010, while Friday is the only route for which the two average amounts of trash are nearly equal. The Thursday, or South Hyattsville route shows the most trash per household in 2009 at almost 240 pounds per month, but this is not significantly higher than the 2009 averages for Tuesday (230 lbs.) or Wednesday (235 lbs.). These 3 amounts, however, are significantly higher than the 2009 Friday amount of 215 pounds. Interestingly, in 2010 the Friday amount is the highest only dropping 6 pounds from 2009, while all of the others significantly decreased.

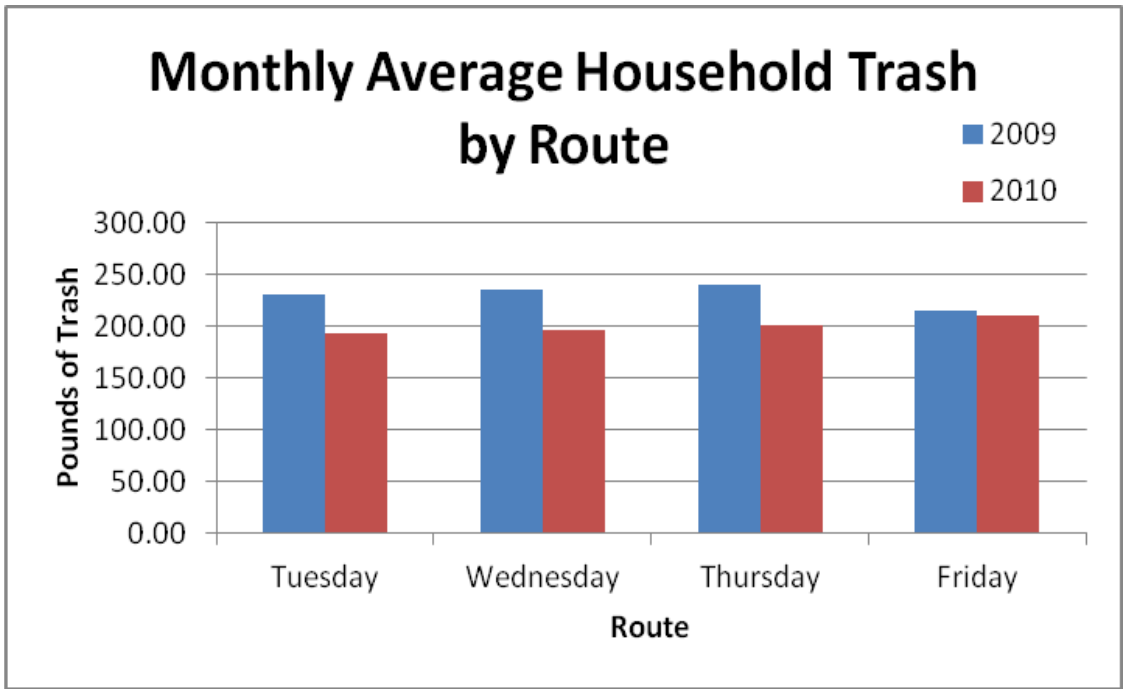



**Figure 4.3. Average household trash per month for each route in both 2009 and 2010.**

The monthly data for each route can also be further separated into weeks (table 4.5 below).

| Week | Tues 09 | Wedn 09 | Thurs 09 | Fri 09 | Tues 10 | Wedn 10 | Thurs 10 | Fri 10 |
|---|---|---|---|---|---|---|---|---|
| Week 1 | 31.94 | 24.34 | 28.63 | 21.60 | 20.53 | 20.36 | 24.28 | 24.93 |
| Week 2 | 20.76 | 18.12 | 19.66 | 17.16 | 19.79 | 17.60 | 16.58 | 17.68 |
| Week 3 | 18.20 | 16.92 | 17.14 | 15.75 | 21.41 | 17.02 | 19.01 | 18.31 |
| Week 4 | 18.31 | 16.06 | 15.90 | 18.35 | 20.20 | 18.92 | 13.74 | 20.82 |
| Week 5 | 20.89 | 17.66 | 19.56 | 18.18 | 18.08 | 12.72 | 15.02 | 15.52 |
| Week 6** | 21.89 | 20.06 | 17.92 | 21.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| Week 7 | 19.54 | 22.65 | 18.41 | 14.48 | 25.72 | 24.68 | 22.27 | 25.98 |
| Week 8 | 20.06 | 18.00 | 17.49 | 20.38 | 21.29 | 17.54 | 20.15 | 18.22 |
| Week 9 | 16.84 | 15.57 | 16.13 | 19.87 | 21.27 | 17.31 | 16.68 | 19.14 |
| Week 10 | 23.21 | 23.97 | 21.54 | 19.24 | 24.20 | 19.61 | 21.28 | 21.61 |
| Week 11 | 20.58 | 20.20 | 18.49 | 17.95 | 20.72 | 16.88 | 19.78 | 20.93 |
| Week 12 | 21.67 | 20.55 | 22.51 | 16.48 | 24.29 | 21.53 | 23.30 | 22.52 |
| Week 13 | 23.19 | 21.10 | 21.51 | 21.44 | 21.94 | 21.39 | 22.66 | 22.26 |
| Week 14 | 25.08 | 25.12 | 21.17 | 21.22 | 30.09 | 23.50 | 24.99 | 24.95 |
| Week 15 | 29.07 | 20.96 | 21.56 | 21.20 | 25.92 | 21.78 | 22.67 | 25.48 |
| Week 16 | 28.67 | 25.35 | 22.93 | 22.56 | 24.24 | 22.30 | 20.58 | 24.54 |
| Week 17 | 29.72 | 25.59 | 28.02 | 21.68 | 22.33 | 17.86 | 19.52 | 25.24 |
| Week 18 | 28.37 | 23.67 | 25.73 | 26.81 | 22.02 | 21.50 | 22.69 | 22.75 |
| Week 19 | 31.62 | 27.03 | 27.86 | 26.81 | 24.51 | 17.60 | 21.27 | 21.46 |
| Week 20 | 28.92 | 27.19 | 23.11 | 27.42 | 21.30 | 21.78 | 22.67 | 25.48 |
| Week 21 | 30.41 | 27.74 | 30.54 | 30.52 | 25.71 | 22.75 | 24.19 | 24.16 |
| Week 22 | 32.24 | 27.43 | 31.28 | 19.19 | 25.10 | 22.36 | 23.25 | 26.22 |
| Week 23 | 32.79 | 23.23 | 32.25 | 24.81 | 24.88 | 21.65 | 21.33 | 22.49 |
| Week 24 | 32.02 | 23.14 | 26.02 | 28.96 | 21.83 | 18.23 | 21.45 | 23.45 |
| Week 25 | 29.81 | 25.92 | 26.13 | 27.15 | 22.72 | 19.11 | 19.62 | 16.34 |
| Week 26 | 23.20 | 20.07 | 18.75 | 20.05 | 22.89 | 21.12 | 21.48 | 25.34 |
| Week 27 | 37.60 | 33.61 | 32.03 | 31.91 | 23.01 | 19.23 | 2.97 | 23.28 |
| Week 28 | 24.61 | 25.56 | 23.12 | 22.34 | 22.15 | 22.78 | 19.47 | 22.38 |
| Week 29 | 29.22 | 21.52 | 21.69 | 24.38 | 22.03 | 18.59 | 21.96 | 22.22 |
| Week 30 | 26.61 | 23.76 | 23.75 | 23.44 | 21.37 | 19.83 | 20.95 | 24.96 |
| Week 31 | 27.71 | 23.27 | 23.35 | 26.75 | 24.96 | 21.23 | 20.77 | 24.25 |
| Week 32 | 24.98 | 24.67 | 23.37 | 24.16 | 23.25 | 19.17 | 21.62 | 25.18 |
| Week 33 | 25.12 | 22.95 | 24.10 | 20.89 | 27.29 | 19.79 | 20.39 | 25.51 |
| Week 34 | 26.26 | 27.13 | 26.72 | 24.14 | 24.71 | 21.01 | 22.44 | 24.03 |
| Week 35 | 29.15 | 27.59 | 23.27 | 22.95 | 22.99 | 19.78 | 20.79 | 23.91 |
| Week 36 | 27.16 | 24.52 | 23.08 | 24.98 | 24.80 | 19.66 | 21.72 | 22.29 |
| Week 37 | 25.79 | 23.82 | 22.04 | 23.17 | 21.71 | 19.98 | 19.41 | 21.07 |
| Week 38 | 28.21 | 18.25 | 20.81 | 22.18 | 21.55 | 19.15 | 16.69 | 21.71 |
| Week 39 | 22.55 | 21.87 | 21.89 | 22.28 | 17.22 | 18.95 | 21.48 | 20.87 |
| Week 40 | 25.42 | 22.44 | 12.66 | 10.39 | 21.41 | 18.96 | 21.23 | 22.16 |
| Week 41 | 20.83 | 20.32 | 19.02 | 16.84 | 18.18 | 22.12 | 20.29 | 19.64 |
| Week 42 | 22.51 | 21.48 | 25.33 | 18.50 | 22.99 | 17.07 | 17.98 | 22.06 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Week 43 | 18.80 | 23.49 | 25.56 | 21.68 | 21.28 | 17.27 | 19.07 | 21.35 |
| Week 44 | 21.72 | 23.09 | 27.05 | 19.50 | 23.52 | 18.64 | 19.15 | 21.01 |
| Week 45 | 23.87 | 21.43 | 20.92 | 22.25 | 18.62 | 23.71 | 26.35 | 21.67 |
| Week 46 | 28.66 | 19.02 | 25.56 | 17.51 | 18.74 | 17.07 | 20.37 | 22.48 |
| Week 47** | 28.59 | 19.29 | 27.09 | 17.09 | 15.85 | 21.23 | 16.34 | 23.51 |
| Week 48 | 37.98 | 24.57 | 38.39 | 29.43 | 26.27 | 25.98 | 24.10 | 25.18 |
| Week 49 | 20.15 | 20.16 | 21.55 | 17.06 | 19.00 | 16.09 | 18.55 | 18.19 |
| Week 50 | 23.51 | 19.18 | 21.13 | 19.06 | 19.68 | 14.80 | 22.95 | 15.95 |
| Week 51** | 19.95 | 18.36 | 15.63 | 10.69 | 8.24 | 15.39 | 13.66 | 12.30 |
| Week 52** | 28.54 | 30.33 | 26.42 | 25.29 | 8.59 | 13.58 | 17.23 | 20.49 |
| Total | 1334.50 | 1179.32 | 1205.77 | 1119.19 | 1112.39 | 998.16 | 1028.39 | 1123.47 |
| Total/Household | **1.43** | **1.45** | **1.48** | **1.31** | **1.19** | **1.23** | **1.26** | **1.31** |
| Average | 25.66 | 22.68 | 23.19 | 21.52 | 21.39 | 19.20 | 19.78 | 21.61 |
| Avg./Household (pounds) | **54.95*** | **55.86*** | **56.76*** | **50.29** | **45.81** | **47.28** | **48.41** | **50.48** |
| St Dev | 4.89 | 3.67 | 4.83 | 4.53 | 4.86 | 3.82 | 4.58 | 4.28 |

**Table 4.5. Weekly trash data separated into routes**. * = *Statistically significant compared to 2010. ** = Collection week was affected by holiday scheduling.*

The weekly trash data confirms what was shown by the monthly data as the Tuesday, Wednesday, and Thursday routes of 2009 are significantly higher than of 2010 while the Friday routes remain constant.

***Section 2: House Value Data***

Using the breakdown of routes, it is also possible to gather more information about each route specifically by looking at the average value of their houses as noted by the MD Department of Assessments and Taxation. Relating the values of the houses to the amount of trash produced can answer the question of whether wealthier homes produce more or less trash, and whether they reacted differently to the change in twice a week to once a week pickup. Table 4.6 and figure 4.4 below show the average house value per route and the pounds of trash produced daily per household.

| | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
|---|---|---|---|---|
| **House value** | $247,638 | $243,979 | $263,452 | $234,871 |

| | | | | |
|---|---|---|---|---|
| **Number of Houses** | 934 | 812 | 817 | 856 |
| **Daily Trash Per House 2009 (pounds)** | 7.83 | 7.95 | 8.11 | 7.18 |
| **Daily Trash Per House 2010 (pounds)** | 6.19* | 6.43* | 6.61* | 6.9 |

**Table 4.6. Route house value and daily trash produced per house.** * = *Significant decrease from 2009.*

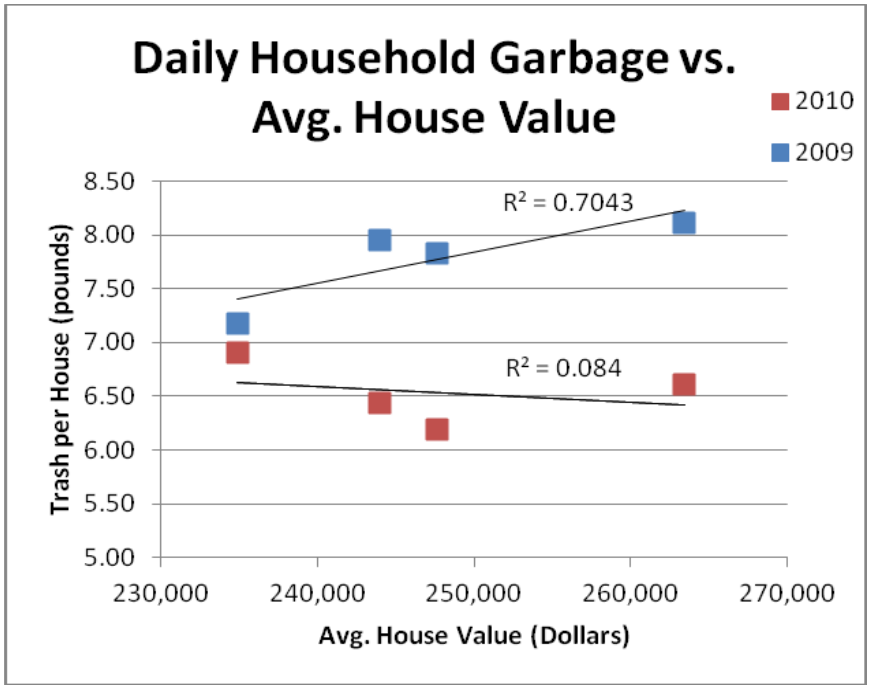



**Figure 4.4. Daily household garbage plotted against average house value.**

The Tuesday, Wednesday, and Thursday routes showed a significant decrease consistent with the other forms of data. From the graph it can be seen that there is a strong correlation ($r^2$ = .7043) between house value and garbage produced in 2009, but that correlation does not exist in 2010 ($r^2$ = .084). The Friday route has the lowest average house value at about 235,000 and is the only route to not show a significant decrease. The difference between years is seen most clearly in the higher valued houses and might show an importance between house value and impact of the pilot program.

*Section 3: Survey Results*

**Survey responses among all trash routes**

The main way that the project quantitatively assessed attitudes of Hyattsville citizens was through analysis of the surveys. To assess the survey responses of our target Hyattsville population, we filtered the survey responses according to the following criteria:

- The respondents must be at least 18 years old,
- The respondents must live in Hyattsville,
- And their trash is not collected on Monday (because there are no Monday trash routes in Hyattsville).

In total we received 142, of which 73 surveys matched the criteria and were eligible for analysis. Those 69 surveys discarded from the analysis consisted primarily of residents outside the area of the Pilot Trash Program. The following data summary is based on those 73 surveys; see Appendix B for the complete survey questions and Appendix C for the full data.

The initial part of the survey focused on attitudes towards the Pilot Trash Program. We used a Likert scale to assess people's attitudes on different subjects. On the survey, the respondents were given the following answer choices for each statement: "Not Important at All", "Somewhat Important", "Neutral", "Important", "Very Important", and "Not Applicable". To scale the response so that it can be measured quantitatively, each of the first five answer choices were assigned quality points from 0 to 5, with

Not Important at All = 1 point

Somewhat Important = 2 points

Neutral = 3 points

Important = 4 points

Very Important = 5 points

Not Applicable = 0 points

To find the mean rating for each statement, the number of responses for each response was multiplied by its quality points or weight. This yielded a weighted response for each question. For example, for the question, "Did the Pilot Program encouraged you to recycle more," 22 people responded "not important at all" with a weight of 1 yielding a total score of 22. By the same token, the 10 people who responded "Very Important" received a weight of 5 yielding a total point count of 50. The totals for each response were summed and divided by the number of respondents, resulting in a weighted mean value of 2.70 for the "encouraging you to recycle more" statement. Therefore, this shows that the mean result falls between "somewhat important" and "neutral" for this statement.

The weighted mean scores for questions regarding the importance of the change in the Pilot Trash Program are provided in figure 4.5. From the data, the Change From Twice a Week to Once a Week has the most importance on saving the city money, with a weighted response of 3.69. The survey participants rank "encouraging you to recycle more" as the factor least affected by the change in the trash collection program, with an

average response of 2.70.

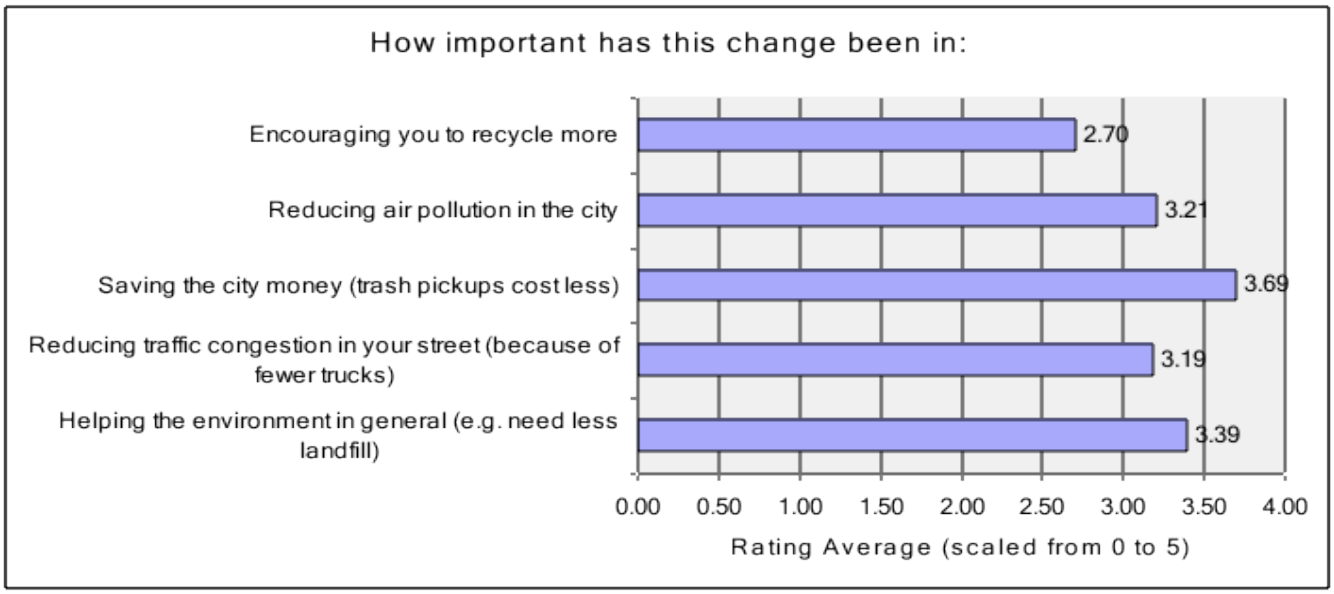



**Fig. 4.5. Importance of change in trash collection program.** *This graph measures the influence of the pilot trash collection program on factors such as lifestyle and city environment. The multiple choice answers are quantified on a scale ranging from "not important at all" to "very important", where 5 corresponds to the highest in importance, and 0 corresponding to "N/A". Sample size = 61.*

The next set of questions focused on change in their lifestyle and their views of the pilot trash collection program. Figure 4.6 summarizes the extent of agreement or disagreement with a set of statements regarding the Pilot Trash Program. The weighted mean value for each statement was found using the process similar to the one described above. The results indicated that the respondents agreed most favorably with the statement "the once a week trash pickup has saved the city money," with an average of 3.61, while agreeing to the least extent "the city should return to a twice a week trash pickup" and "the once a week trash pickup has made me recycle more". See figure 4.6 and appendix C for further details.

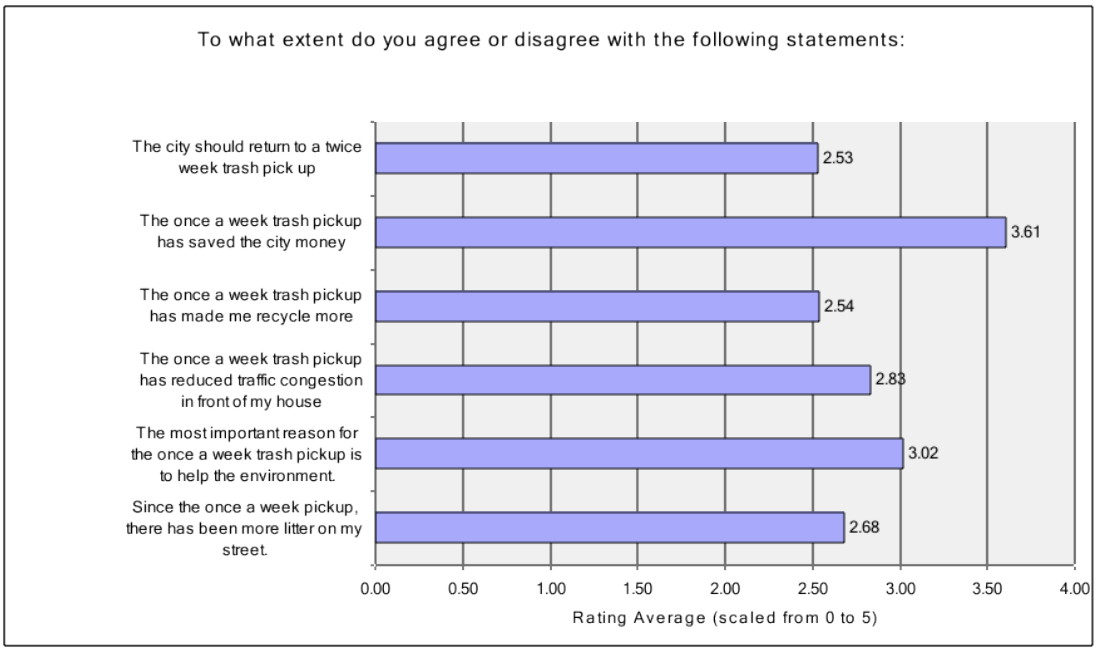



**Fig. 4.6. Extent of agreement or disagreement with statements dealing with the pilot program.** *This graph measures the extent that people agree or disagree to various statements made about the pilot trash collection program. The multiple choice answers are quantified on a scale ranging from "strongly disagree" to "strongly agree", where 5 corresponds to the highest level of agreement. Sample size = 61.*

The last question in this section lists various components of waste produced in a typical household, and asks the survey respondents what they normally do with those items (figure 4.7). For each category of items, the survey respondents are given the following choices: throw in trash bin, recycle, leave item for pickup by a private company, compost, or other. The data reveals that at least half of the waste contributed by papers, aluminum cans, and glass bottles end up being recycled, while a little less than 10 people indicating that items in those categories make their way into the trash bin. Clothes, plant trimmings, and food scraps have the lowest recycling rate.

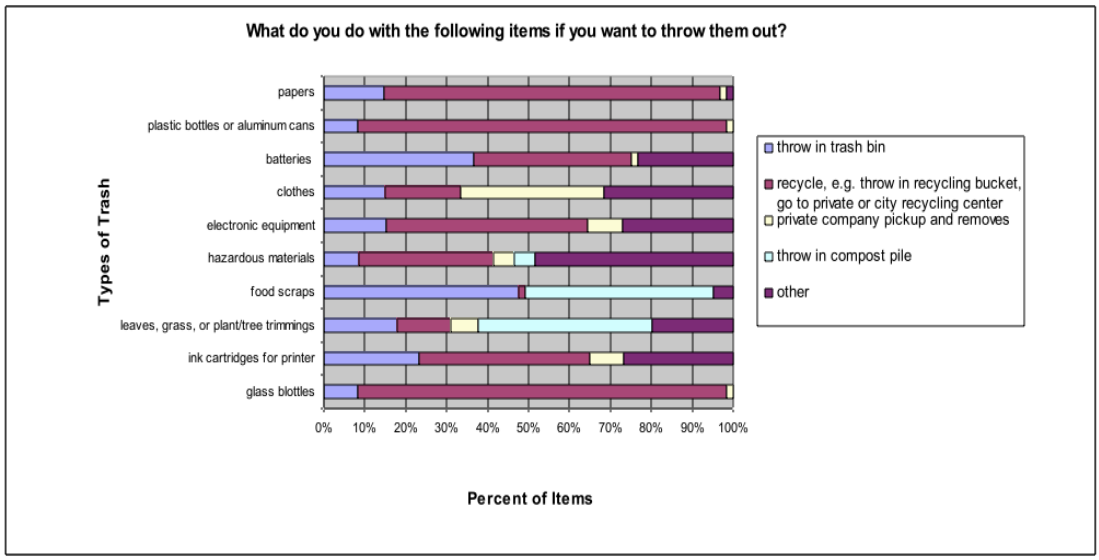



**Fig. 4.7. What do you do with the following items if you want to throw them out?** Each *respondent was presented with an item of trash and asked about the method they used to dispose of it. Sample size = 61.*

Part 3 of the survey focuses on analyzing recycling habits of the Hyattsville citizens. The first question in this section asks the survey takers to rate how important recycling is for accomplishing certain goals using the Likert Scale. The answer choices (with their weights in parenthesis) included: "(1) Not Important at All", "(2) Somewhat Important", "(3) Neutral", "(4) Important", "(5) Very Important", and "(0) Not Applicable". The weighted means for each statement is shown in figure 4.8. According to the survey, people think recycling is most important for improving the environment, saving landfill space, and using natural resources more effectively. On the other hand, they agree to a lesser extent that recycling is important for saving money for themselves, creating a strong U.S. economy, or creating jobs.

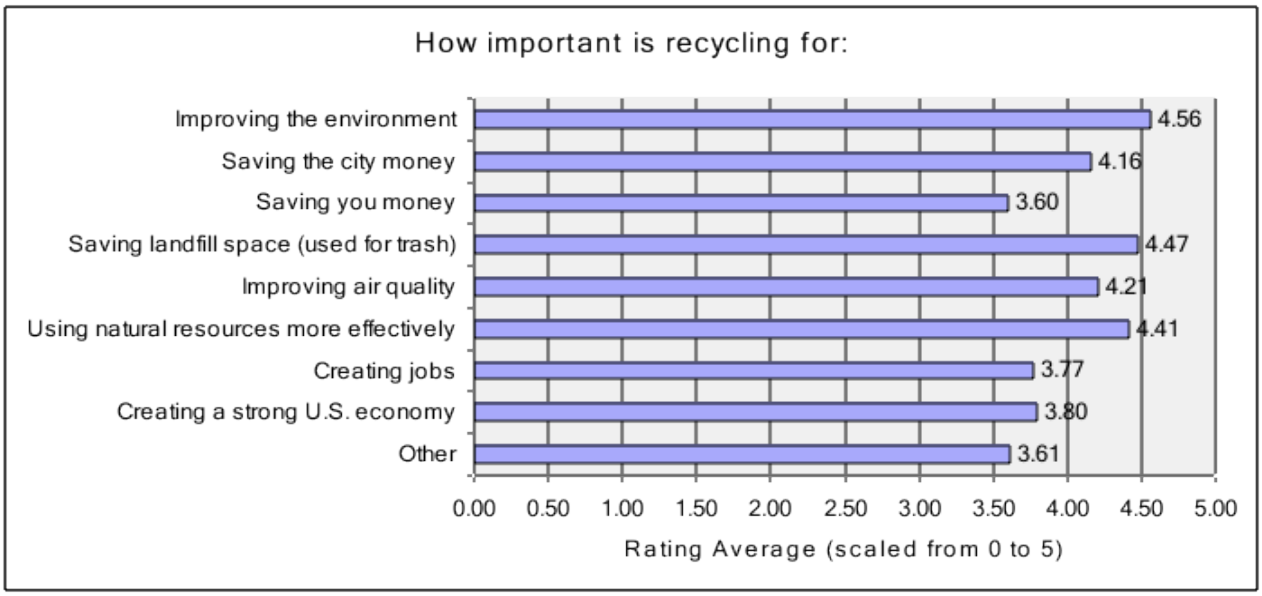



**Fig. 4.8. How important is recycling?** *This graph shows how much influence people regard recycling has in accomplishing certain personal and municipal goals. The multiple choice answers are quantified on a scale ranging from "not important at all" to "very important", where 5 corresponds to the highest in importance, and 0 corresponding to "N/A". Sample size = 59.*

The next set of questions asked respondents the extent to which they agree or disagree with statements about recycling. As noted in figure 4.9, this question shows that people agree to the greatest extent that there is a need for more recycling, and that the city should do more to encourage recycling. There is the least agreement for statements that suggest that recycling is messy/dirty, there are less expensive ways to save the environment, or that recycling raises the price of goods and services.

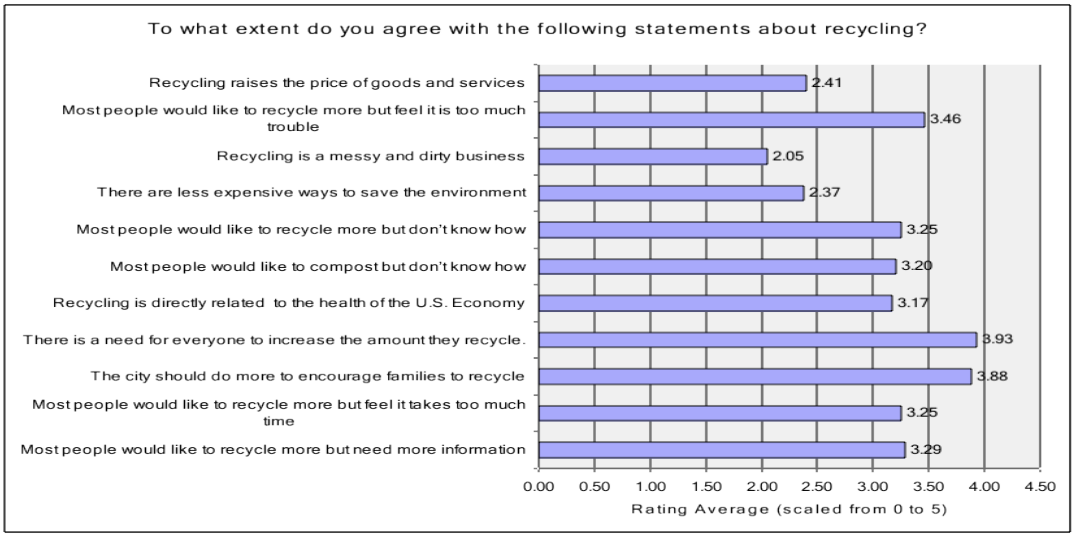



**Fig. 4.9. Extent of agreement or disagreement with statements dealing with recycling.** *This graph measures the extent that people agree or disagree to various statements made about recycling. The multiple choice answers are quantified on a scale ranging from "strongly disagree" to "strongly agree", where 5 corresponds to the highest level of agreement. Sample size = 55.*

influenced Hyattsville citizens' perceptions and habits towards recycling and trash production.

Our survey indicates that the majority of people had never heard about the zero waste initiative before taking the survey, but half of the respondents feel that it is a good idea (*figures 4.10 and 4.11*).

**Fig. 4.10. Have you ever heard of Zero Waste.** *Sample size = 59.*

**Fig. 4.11. Is Zero Waste a good idea?** *Sample size = 59.*

When asked if they feel that Hyattsville could accomplish the goal of the Zero Waste initiative, responses were equally divided, with almost the same number of people responding to "Yes", "No", and "Maybe" (figure 4.12).

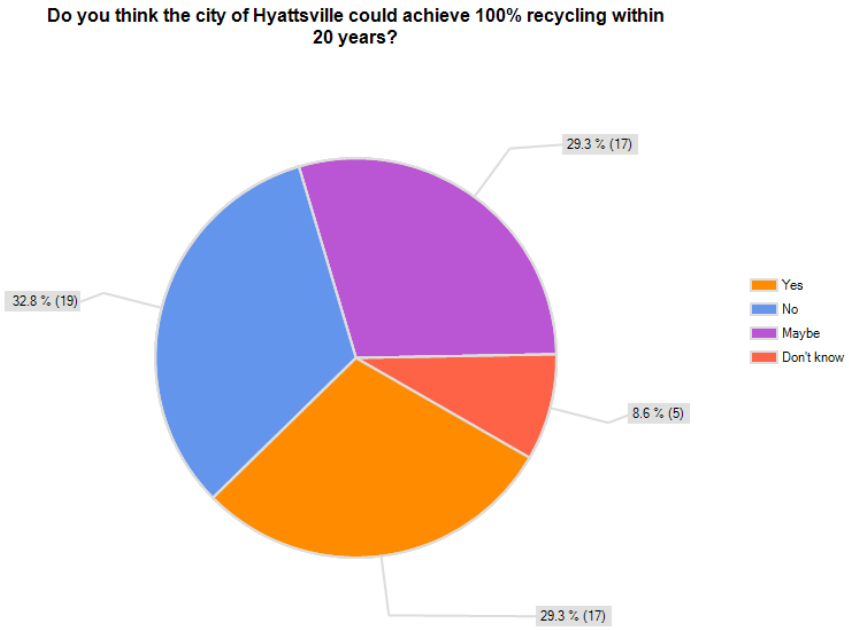



**Fig. 4.12. Can Hyattsville achieve 100% recycling?** *Sample size = 58.*

People were then asked how many trash bins they filled up in a week. The responses were categorized according to the following categories:

1 Less than 1 trash bins per week ($x \leq 1$)

2 More than 1 and up to 2 trash bins per week ($1 < x \leq 2$)

3 More than 2 and up to 3 trash bins per week ($2 < x \leq 3$)

4 More than 3 trash bins per week ($x > 3$)

The majority of the responders used less than 1 trash bin per week (figure 4.13).

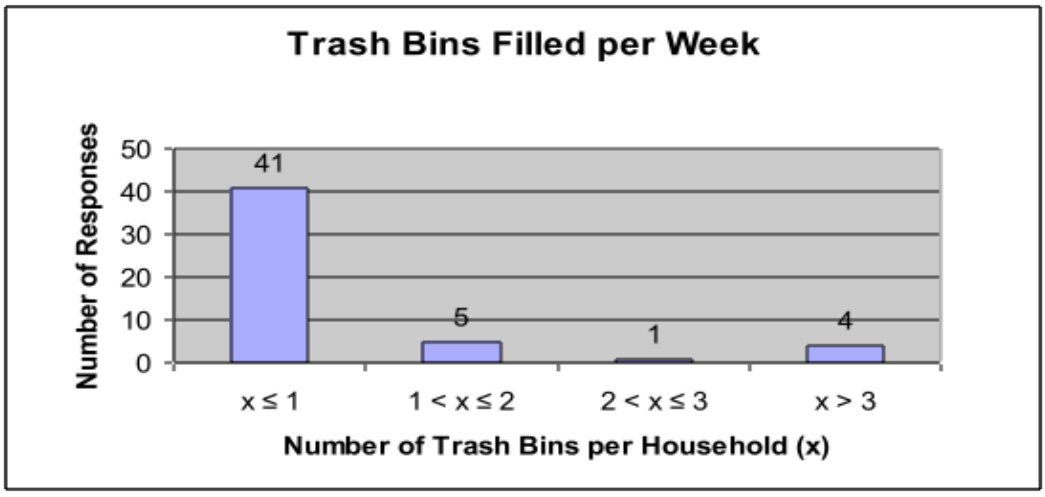



**Fig. 4.13. Number of trash bins filled per week per household.** *This graph shows the number of respondents in each category. Sample size = 56.*

Even though trash is now collected once a week instead of twice a week, almost 70% of people either never, or rarely, run out of trash bins (figure 4.14). When they do run out, the majority over fill the trash bin, or save the trash until the following week (figure 4.15).

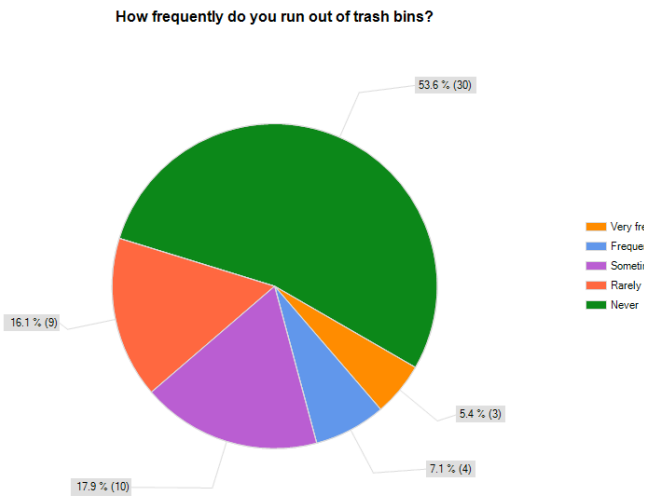



**Fig. 4.14. How frequently do you run out of trash bins?** *Sample size = 56.*

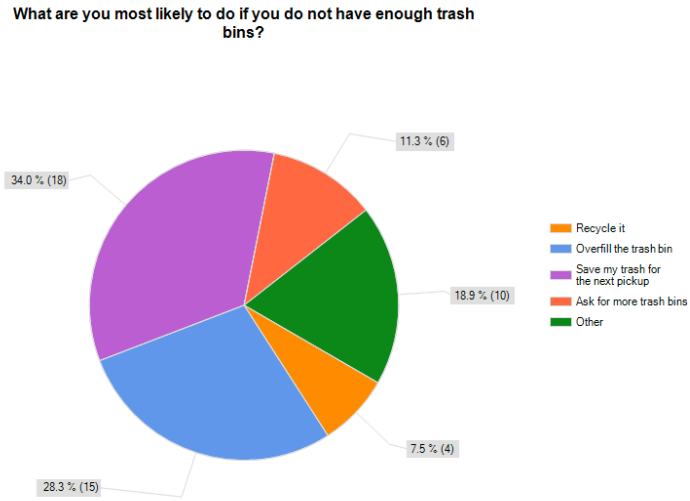



**Fig. 4.15. If you don't have enough recycling bins?** *Sample size = 53.*

By contrast, people are more likely to run out of recycling bins. 51.8% of the respondents replied that they never or rarely run out of recycling bins (figure 4.16). When they do run out, half of the respondents save the recyclables for the next pickup, which is a higher percentage than if they run out of space in their trash bins. Around 16.4% throw their recyclables in the trash in that situation (figure 4.17).

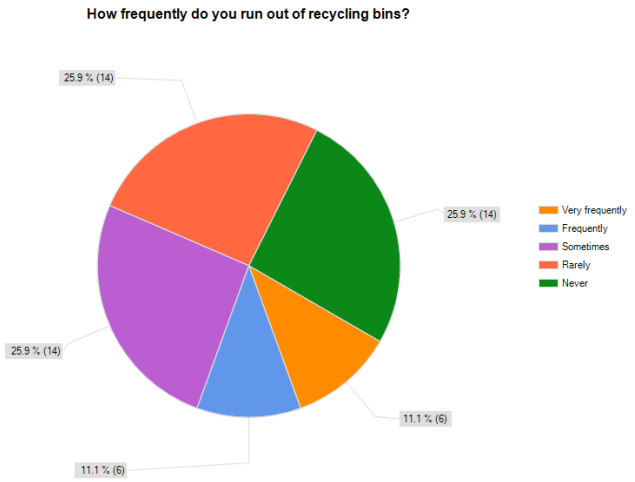



**Fig. 4.16. How frequently do you run out of recycling bins?** *Sample size = 54.*

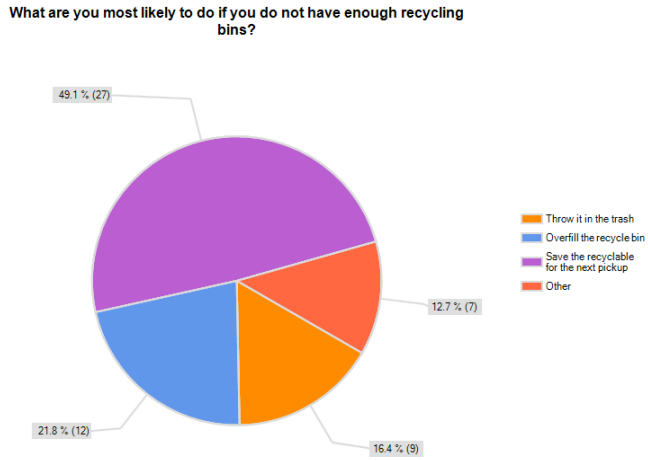



**Fig. 4.17. If you don't have enough recycling bins?** *Sample size = 55.*

The next question deals with how many recycling bins each household filled up per week. Let x = the number of recycling bins filled per week. The responses were categorized according to the following categories:

Less than 1 trash bins per week ($x \leq 1$)

More than 1 and up to 2 trash bins per week ($1 < x \leq 2$)

More than 2 and up to 3 trash bins per week ($2 < x \leq 3$)

More than 3 trash bins per week ($x > 3$)

The majority of the responders used less than 1 recycling bin per week (figure 14.18).

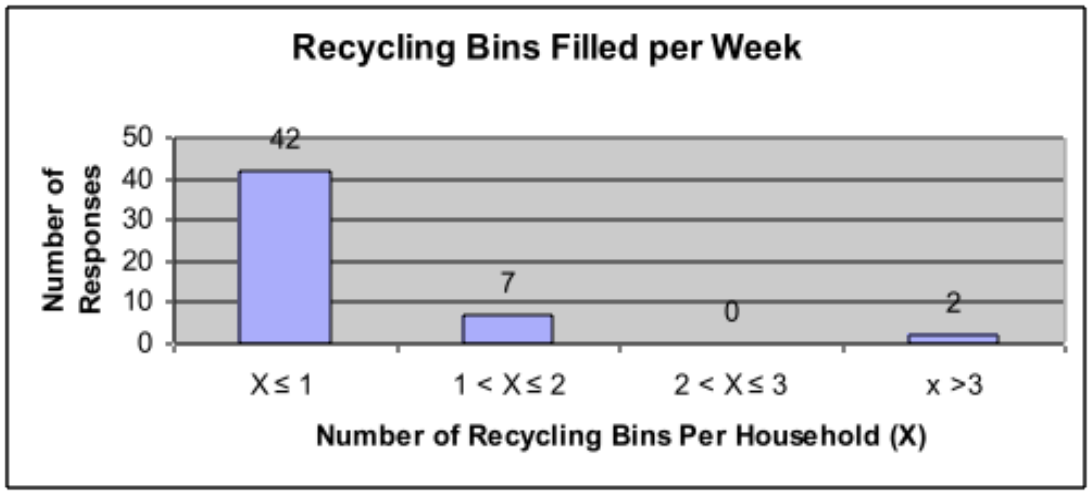



**Fig. 4.18. Number of recycling bins filled per week per household.** *This graph shows the number of respondents in each category. Sample size = 54.*

The last part of the survey asks miscellaneous questions that can be answered with "Yes", "No", or "Don't Know" (figure 4.19). Overall, a majority of people did not feel like the pilot trash program influenced the way they disposed of trash nor their recycling habits. The majority feel like they have enough trash and recycling bins.

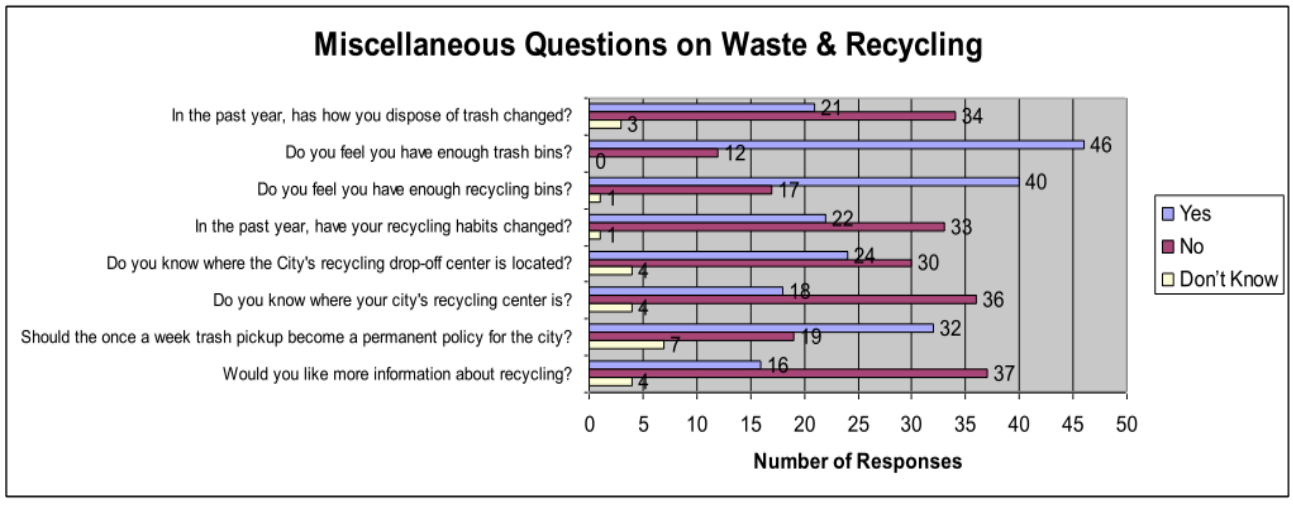



**Fig. 4.19. Miscellaneous Questions on Waste & Recycling.** *This graph shows the responses to these various questions. The number of responses is shown next to each response for each question. Sample size = 58.*

**Survey Responses, comparing among individual trash routes**

After the survey responses were analyzed across all of Hyattsville, the survey questions were analyzed across different truck routes to compare attitudes across the different areas of Hyattsville. Presumably, different trash routes represented different socioeconomic groups. The survey used the question, "What day of the week is your trash picked up?" to determine how many respondents belonged to each trash route *(*table 4.7*)*.

***What day of the week is your trash picked up?***

| Day | Response Count |
|---|---|
| Monday | 0 |
| Tuesday | 20 |
| Wednesday | 11 |
| Thursday | 23 |
| Friday (for North Hyattsville residents) | 4 |
| Friday (for West Hyattsville residents) | 4 |

**Table 4.7. What day of the week is your trash picked up?** *This table displays the number of respondents of each trash route. Sample size = 62.*

The survey questions for each route were analyzed in the same way as in the analysis of responses across all of Hyattsville. The results across the different routes were then compared side by side. The major trends of each question will be summarized in the section below; see appendix for full data across each trash route.

The first set of questions focused on the Pilot Trash Collection and asked the respondents to rank how important the change to once a week trash pick up has affected various aspects of their lifestyle. Most of the trash routes ranked "saving the city money" as the most important change, and "encouraging you to recycle more" as the least

important change. By contrast, Wednesday trash route ranks "helping the environment" as the factor that was most impacted by the change due to the pilot program.

In addition, the respondents were asked their level of agreement to different statements regarding the program. The responses for the different answer options were varied across the trash routes. Most of the routes agreed most with "the once a week trash pickup has saved the city money" and disagreed most with "the city should return to a twice a week trash pick up." Tuesday residents deviated the most from the overall trend, with most agreement with the statement, "since the once a week pickup, there has been more litter on my street," and least agreement with "the once a week trash pick up has reduced traffic congestion in front of my house."

In terms of recycling, Hyattsville residents believe that recycling is most important for improving the environment and saving landfill space. On the other hand, they indicated that recycling was least important for creating a strong U.S. economy and saving their own personal money.

The next question about recycling showed that the respondents feel that there is a need for everyone to increase the amount they recycle, and that the city should do more to encourage families to recycle.

The answers to the questions pertaining to Zero Waste had very constant answers across the different trash routes. Most people across the routes had never heard of the Zero Waste initiative, thought it was a good idea, and did not feel that Hyattsville could achieve 100% recycling within 20 years. However, the Thursday route differed, with 42.9% of its respondents indicating that Hyattsville could reach 100% recycling within 20 years.

The next questions asked about trash and recycling bins. The majority of each trash route felt that 1 trash bin was sufficient, and never ran out of trash bins. If they did run out of trash bins, the most popular option for most of the routes would be to save trash for the next pickup. However, the most popular option for Tuesday's trash route was to overfill the trash bin (43.8%) of the responses. Regarding recycling bins, the majority of each trash route also felt that 1 recycling bin was sufficient, and sometimes, rarely, or never produced more than 1 recycling bin of recyclables. Most of the respondents would save their recyclables for the next trash pick up if they ran out of recycling bins. However, a number of people would overfill the recycling bin or through the recyclables in the trash. Friday (west) had a majority of people who indicated that they would throw the overflow recyclables into the trash.

The final set of questions further asked the residents about their attitudes on recycling and trash pickup. Overall, the Tuesday trash route felt that their habits of disposing of trash have not changed during the past year, but that their recycling habits have. The Wednesday trash route felt that their habits of dismissing of trash have slightly changed, but that their recycling habits have not been affected. The Thursday and Friday (North) trash routes felt that their disposal of trash has not changed, but their recycling habits have changed. The Friday (West) trash route felt that both their trash disposal and recycling habits have changed over the past year.

The majority of people from Tuesday, Thursday, and Friday (West) routes knew where the city's recycling center and recycling drop-off center is located. However, more people from the Wednesday route did not know where either the recycling drop-off or the recycling center was located than people who did know. The majority of Friday

(North) routes did not know where the recycling drop-off center was, but knew where the recycling center was.

When asked whether once a week trash pickup should become a permanent policy for the city, the responses were generally positive across the Wednesday, Thursday, and Friday (North) trash routes. However, for the Tuesday route, 44% of the respondents replied with "yes", while 44% of the respondents replied with "no". Also, the Friday (West) route had more respondents answering "no" than "yes".

The residents were then asked if they would like more information about recycling. The majority replied with "no" to the question.

To determine if the amount of variation between answers from different trash routes were statistically significant, the coefficient of variation was calculated for the mean values of each applicable question. The coefficient of variation is used to determine if there was variation in the answers across the five different trash routes. See Appendix B for the values of coefficient of variations for each applicable question and the description of how they were calculated.

The values for the coefficients of variation, when analyzing all of Hyattsville as a whole, were around the same values of the coefficients of variation when analyzing the responses of each trash route individually. This shows that there is the same degree of variability in answers within the trash routes as there is variability among the different trash routes. Therefore the responses that the residents gave might not have been strongly influenced by the trash pick-up route that those residents lived on.

**Part B. Qualitative Data**

***Section 1: Interview Results***

Over a half a year, we conducted a series of in person interviews with people who would be most knowledgeable about the design and implementation of the Pilot Trash Program. The purpose of these interviews was to complement the online surveys and in person interviews targeted to Hyattsville residents. The other goal of these interviews was to gather additional insight into the process of developing a new Trash Collection program, and to gather initial assessments of the success or failure of the program. Our respondents ranged from the truck drivers who collect the trash to members of the Hyattsville City Council, who approved the change in policy. After conducting interviews with several members on the Hyattsville city council, Hyattsville Environmental Committee, and truck drivers in charge of trash pick-up, we were able to find out many of the motivations, problems, and successes of the once-a-week pilot program.

According to the interviewees, there were two primary reasons to start the pilot program: economic and environmental. The principal argument was that the reduction would save in operation costs to the city in terms of savings on wear and tear of the equipment, savings on gas consumption, and savings on personnel expenditures. Further, if the change were to result in a reduction in trash, the cost of disposal would also be reduced.

The program was successful, saving about $83,000 to $89,000 last year (see Appendix.) The savings came from reduced consumption of fuel, equipment, and

resources. These savings meant that fewer city employees had to be laid off during the economic recession.

The environmental justification for the once a week system was premised on the belief that the prior system did not encourage recycling or trash reduction. The Hyattsville mayor felt that the city was spending too much money picking up trash in a way that encouraged the overuse of garbage disposal and that people were abusing the twice a week trash pick-up system. Presumably, some residents did not care when they put out the trash because if they missed the first pick-up day, then the second one would come along soon enough. This new system is stricter – missing trash day resulted in an extra week's worth of trash in the house until the next pick-up day. Alternatively, households would now have an incentive to recycle the trash rather than let it accumulate.

In order for the Pilot Trash program to be effective in reducing trash and increasing recycling, residents have to be aware of the program. Communication and outreach were critical elements of the Pilot Trash Program.

Our respondents felt that the majority of Hyattsville residents were informed and aware of the program details. They mentioned a brief outreach program that sent out mailers to anyone who had trash service as well as posting notices on the trash cans of households. None of our respondents heard any resident complaints about being unaware of the new once-a-week program. Others noted that even if an individual was truly unaware of the change, it would not be difficult to adapt quickly once the program started.

However, our respondents did identify some problems while trying to inform the citizenry. For instance, the culturally diverse community of Hyattsville has many people

who do not understand English. The primary language of the outreach program was English, and consequently many households would not have benefited from the extensive publicity effort. In addition, among rental properties, the information materials were directed to landlords who probably may not have shared it with their tenants. In this light, one might conclude that the lack of knowledge among renters was more a problem of irresponsibility with landlords than the city. Notably, however, one might argue that the city should have made it clear to landlords that they had to let their tenants of the changeover. Overall, the general consensus is that the city gave sufficient time and materials to the residents to inform them of the change.

As noted earlier, the city sought to achieve significant cost savings with the once-a-week program. The city somewhat accomplished its economic goal. By the end of the year, the city was able to save $83,000 to $89,000. However, this was significantly less than what was expected.

As for the environmental goal, most interviewees felt that the amount of trash was reduced, although they were unsure whether this could be attributed to the once-a-week program or not. Some believed that the negative economic conditions may have contributed to lesser amounts of trash. Before the pilot program was implemented, a truck driver reported that about 8-9 tons of trash was collected at the end of the day. After the program, there was only 4.5 to 6.5 tons. There also seemed to be more requests for recycling bins, which may imply that more waste is diverted to recycling than before the pilot program. However, these are all just conjecture because there was no control group set up to test the effects of the pilot program. Confounding variables such as a

more rigorous recycling program and economic recession leading to less trash output make it difficult to attribute less trash to the pilot program.

The interviews also sought to find out current perceptions about recycling in Hyattsville and whether or not these attitudes and beliefs were in part due to the once-a-week trash collection. In general, our respondents said that people recycle because it is part of their current culture. The action itself seems virtuous and if presented with the opportunity and means, most people would recycle. One interviewee mentioned that even diehard conservatives would not argue against it because "you are basically conserving resources and who would not want that?"

As with the trash collection, the success of recycling depends on knowledge of the consumer. When asked whether Hyattsville was distributing recycling information effectively, the general answer was that there was room for improvement. Before the pilot trash program began, the county gave out new blue toters to the community to use as trash containers, along with a significant amount of literature on the how and why of recycling. However, since those things were given out, there has not been any new information or literature. One interviewee felt that residents did not make the connection between recycling and saving the city (and as such, taxpayers' money). If recycling could be linked to savings that accrue to a reduction in city trash collection, consumer behavior might change. Recognizing the need for improvement, most agreed that Hyattsville should create recycling programs to educate the citizenry. However, one person felt that the programs were there already, such as distribution of fliers to promote recycling and electronics recycling day. However, that person felt that the residents just had to be continually reminded about the importance of recycling.

It was unclear whether or not the once-a-week had any effect on recycling behaviors and opinions. Those who said "no," felt that there was little to no promoting for recycling when the city changed to collecting trash once a week. Those who were unsure felt that it was possible that less room for trash would force people to recycle. But there is no control or hard data that supports this theory. Those who said yes cited the fact that public works has been receiving more calls about recycling than anything else. It seems like more people have been asking about recycling habits than before. In addition, truck drivers, who can give a first-hand account, have reported seeing recycling bins out more often than before. They have observed an overall increase in recycling.

Finally, the interviewees were asked whether they felt there were differences in recycling habits among different groups of population. Some felt that there were differences but were unable to give any examples. Others felt that there were no differences. One interviewee, in particular, stressed the importance of making it clear to everyone that recycling works and to give the residents every incentive to recycle.

***Section 2: Focus Group Results***

The focus group began with an introduction of the goals and objectives of the overall project. We followed this introduction with a summary of what we hoped to accomplish from this session. As noted earlier, our participants were very active in the community. And as we hoped there was a lively discussion, and more significantly, several topics were raised that we had not considered

For example, one question raised focused on whether or not compost attracts rats. This has been a major argument of opponents to a once a week trash pickup, since with

fewer pickups, trash would begin to accumulate. As a group, the argument was discredited by observing that rats in garbage are not common in compost piles in Hyattsville. The entire group decided that more composting should be recommended for environmental purposes as well as convenience purposes. Another participant observed that most people in Hyattsville do not recycle. We discussed the role of public schools and how they have failed in this area. In addition, the idea was raised that areas such as Bladensburg Park should be policed for people who are not good recyclers and help them. Others noted the need for other agencies to work with the city in order to promote recycling.

Another area of discussion focused on the pragmatics of recycling. While reviewing the different categories of recycling we hit a roadblock when it came to categorizing Styrofoam. The group finally established that it could not be recycled. It was surprising that even this well informed group of concerned individuals had trouble with this. The discussion highlighted the difficulties in recycling and led the group to conclude that there must be more information given to residents. Indeed, one participant suggested that idea of a city-based "trash hotline," that could address questions like these.

With respect to education, the entire group agreed that recycling information needs more publicity in Hyattsville. Currently, Hyattsville's outreach to promote recycling only reaches about one quarter of the city's population. The public needs to be educated about programs such as those run by MOMs organic market which collects car batteries and programs run by the city which collect hazardous material. Indeed, none of the participants knew what to do with propane canisters. We also discussed the adequacy

of the bins being provided for trash. Holiday flexibility was highlighted as becoming even more of an issue with once a week pickups.

The participants were in agreement that the main reason the city engaged in the program was to save money and the secondary reason was to reduce trash. On a positive note, the group was pleasantly surprised at how many people had increased recycling since the implementation of "toters."

Ultimately, our participant agreed that a key strategy to promote recycling is to make information accessible by publicizing in high traffic areas, and in formats which will engage the public and make people want to read it. For example, the group agreed that places such as the HOPE listserve were effective in conveying information to concerned residents, but there needs to be more of an effort to reach those who could potentially express concern and a disregard for a small part of the population which is hopelessly indifferent to the issue of waste reduction.

We found it important to highlight one person's observation that "recycling is downcycling" and that even recycling uses up resources that can never be regained. In essense, recycling and reuse is not a substitution for an absolute decline in consumption. This stresses the importance of not only trash reduction, but material conservation. The city should consider this theme in any new programs to encourage recycling. We concluded this session, with a discussion of a hypothetical situation of a zero-waste initiative in Hyattsville. Participants were very skeptical; they had many recommendations to reduce waste. Most of these recommendations focused on specific actions that could be taken by households. Suggestions ranged from specific actions such as to not use clothes dryers to policies to affect resident behavior, including, "Pay as you

Throw Programs" which entailed selling special yellow bags that were necessary for trash pickup or to weigh trash and make people pay based on weight or size. Despite such innovative suggestions, the general consensus was that though a worthy goal, reaching it would be very difficult.

A key goal of the discussion was to obtain feedback on the change in trash pickup schedule. Notably, all our participants were in favor of the change. However, the group did point out several weaknesses in the program and discussed several remedies that seemed effective. On the whole, the focus group was extremely useful in the unveiling of attitudes towards the pilot program and recycling in general.

Notably, the members of the focus group were not surprised by the change to once-a-week. In their opinion, the change was pretty well publicized, with fliers and English and Spanish stickers on the garbage cans that gave out this information. More toters were also distributed before the program, announcing the program's arrival. One member in particular mentioned that almost everyone he knew in the neighborhood read the Hyattsville Reporter and received the change notification on the Hyattsville Environmental Committee's listserv.

There were a few problems mentioned concerning the once-a-week program. The first was adequately informing the city's rapidly expanding Hispanic population. Much of the information published by the city is in English and consequently there needs to be a greater focus on putting things out in Spanish. Additionally, Hispanic households are sometimes made up of extended family members as well as immediate family members. The greater amount of people means more trash output, which can be a problem when trash is only collected once a week. Indeed, one of the concerns of the change was that

there would be too much trash for just once a week pickup. However, the members noted that this was rarely a problem, and most likely to occur during the holidays, or other special events. To solve this problem, some people can request the City for an extra trash container that gets picked up. The group members also suggested that one could also call and ask to have the trash picked up.

The people against the once-a-week program generally cite the problems with overflowing trash such as odor, attracting rats, maggots in trash, and also the fact that twice-a-week is just more convenient for the residents. Their reasoning is that since their taxes are paying for it, they should be allowed to have it twice a week. It should be noted that the majority of the people who were interviewed did not agree that the problems of attracting rats and maggots have materialized.

When asked to talk about trash reduction, the focus group suggested several ways that trash output could be reduced even further besides the once-a-week program. Some felt that if trash was weighed and residents had to pay for trash pick-up, this would greatly reduce the amount of trash produced. Others suggested a pay-as-you-throw program where residents are limited to the number of trash bags a week, with each bag costing $1. Going along with this program, the city would try to reinforce the idea that people will benefit from creating less trash. Another simple suggestion was to just have tinier trash cans. That would encourage residents to put out less trash because too much trash would make the can overflow.

Most people present at the focus group found recycling easy because they were people that cared about the environment. However, they were able to understand why it is sometimes difficult for others to recycle. They mentioned that there were brochures

that tell people how to recycle, but many people do not pay much attention to brochures handed out to them. The general consensus was that there were two main reasons why people do not recycle. The first reason is that people just do not care. The other reason, which is usually the case, is that people do not know how to. For instance, residents complain about things like "crab guts" and other materials that they do not know how to recycle. Although yard waste can be put into the wrong containers, in general, if one puts trash in the wrong container, he or she will get a warning sticker. Prince George's County does occasionally send out information about where to dispose random items like ink cartridges, paint cans, car oil, etc. but most of this information must be researched personally.

The majority of the focus group felt that saving the environment was the main reason to recycle. In addition, it was noted that the Pilot Program saves money for the city. However, some people are jaded by the concept of recycling, calling it more like "down-cycling." One person who attended the focus group explained that most items cannot be recycled forever. Essentially, recycling is just delaying things from inevitably becoming trash. For example, paper can only be recycled so many times, with the new recycled papers being lower and lower in quality. From an environmental standpoint, it is better to reduce the amount or resources used (and therefore the waste produced) than to recycle used resources. In the end, the resources that are expended will become waste no matter how much recycling is done. In this light, the long term trash solution lies in reducing overall consumption, reflecting a fundamental shift in consumer behavior.

# Chapter 5: Conclusions

### *Section 1: Trash Output and House Value Conclusions*

The trash and recycling data show that after the pilot program started in Hyattsville, there was a clear decrease in amount of trash produced, but without a complimentary increase in recycling. In general, the trash data fluctuated more than the recycling data over the study period, but after week 15 the amount of trash produced in 2010 stayed lower than in 2009. The weekly trash data also shows that in 2009 there were peaks in trash collected after holidays, but that same trend did not appear in 2010.

Looking at the 4 routes separately for each year, the results show that the Tuesday, Wednesday, and Thursday routes all decreased trash output from 2009 to 2010, while the Friday route did not. In fact, the Friday route was the largest producer of trash in 2010 after being the lowest in 2009. Relating this trash data with the house values for the 4 routes, there was a strong positive correlation in 2009, but nearly no correlation in 2010. The Friday route, while being the lowest producer of trash in 2009 and highest producer in 2010, also has the lowest average house value.

The biggest question from the results is where did the trash go. After declining 500 tons in 2010, only 23 more tons were recycled. If the decline in trash did not yield a subsequent and equal increase in recycling, there must be a different explanation for what accounts for those 477 tons of garbage. One possibility is that the pilot program worked in its goal to reduce trash output, without necessarily succeeding in increasing recycling. Citizens might have found that having their trash collected only once a week changed their disposal habits. Without the luxury of their trash being removed twice a week, the inhabitants of Hyattsville adjusted by producing less garbage to prevent the trash from

piling up too quickly. This theory is supported by the apparent adjustment of the citizens after week 15 in 2010, which will be discussed later. Another possibility is that there might have been less people in Hyattsville. The city has a large transient population, especially including people of Hispanic heritage, and their impact could have been seen if the population decreased during the 2 year study period. Without statistics on the population change of Hyattsville between 2009 and 2010, however, it is impossible to tell whether that was the case. The declining economy may be another reason that the trash numbers saw such a large decrease. People could be trying to save money by making less purchases and consequently have produced less trash because of it. In the reduce-reuse-recycle model, the citizens of Hyattsville might have turned to reducing and reusing instead of recycling as we can see from the numbers. Recycling numbers also underestimate the amount recycled because it does not include composting, recycling electronics, and other forms of disposal. This systematic deficiency, however, was present in both 2009 and 2010 so it should be reflected evenly in the data except if significantly more waste was composted or recycled without being placed in recycling toters. A final possibility that cannot be explored given the trash data is any increase in littering or trash in public places. Citizens may have found that if their trash is being picked up once a week, it is just as easy to take their trash to public dumpsters.

As touched on before, the results show evidence that the pilot program likely had an effect on the amount of trash produced. After week 15 in 2010, the 2010 trash produced was significantly lower than in 2009, meaning the citizens might just have needed a bit of time to adjust to the new schedule. After these 4 months, the recycling again did not change in any way, so it shows the change came solely from reducing the

amount of trash produced. The weekly trash numbers show high volatility, especially in 2009. The warmer months generally see a peak in trash production, but the volatility also comes from high trash amounts after holidays. Between April and July in 2009, there is a large peak of trash production which does not appear again in 2010. This begs the question of whether there was an abnormally high amount produced in 2009 or if in 2010 there was a low amount during late spring/summer. Had there been more data from 2008 and 2011, we could further illuminate these trends, but unfortunately it was not available. Independence Day, Thanksgiving, and Christmas all account for the peak garbage amounts in 2009, but these same flaws were not seen in 2010. The change must have made the trash pickup more consistent at least, but not necessarily better. There were moments when citizens complained of the holiday pickup schedule, especially in holidays affecting only certain days of the week (i.e. Thanksgiving on a Thursday.) In general, however, from the numbers it seems as though the city did a good job of evening out the holiday schedule.

Looking at the routes separately, Tuesday, Wednesday, and Thursday routes show the same trend while Friday sticks out. The overall decrease in trash produced between the two years seems only to be reflected in the Tuesday, Wednesday, and Thursday routes. This could either be because geographically the North and West (Friday) of Hyattsville failed to adjust, or Central and East Hyattsville adopted the change more readily. The Tuesday, Wednesday, and Thursday routes all decreased enough to the point where they were lower than Friday in 2010. This might be due to the large transient population of Hispanics in West Hyattsville who might not have been receptive to the change, or may not have noticed the change at all for not having lived in Hyattsville more

than a year. All of the flyers and updates from the city were posted in English and Spanish so the city tried to disperse the information evenly, though it does not seem that occurred. Unfortunately, the Friday route includes both the North and West of Hyattsville so it's impossible to tell if one geographic location produced more trash than the other. The North of Hyattsville is also fairly separated from the rest of the neighborhoods, so any effects of seeing neighbors decrease their trash output might not have motivated citizens to do the same. This motivation might have existed in Central and Eastern Hyattsville, however, and Hopper and Nielsen (1991) show that your neighbors' habits have a tendency to rub off on your own, especially in terms of recycling and waste disposal.

The Friday route also shows the lowest average house value, which may have an impact on the receptiveness to the pilot program. While in 2009, it seems as though a lower house value indicates less trash produced, that trend does not continue in 2010. Therefore, it cannot be concluded whether there is a relationship between the two variables, but more data is needed to confirm. The interesting thing, however, is that it seems that the lower house value is indicative of less receptiveness to the pilot program. The Friday route did not seem to meet the goal of reducing trash output and might have further ramifications for efforts to decrease trash output and increase recycling in other communities. It might be that less affluent homes are not equipped to handle the amount of information coming from the city including emails, door to door efforts, or community events. If citizens do not have internet they could miss a wealth of information passed on from emailing lists or City of Hyattsville website updates. Also, a large transient population could signify a lesser sense of community which is important in attending

community events about waste disposal and recycling often hosted by the City of Hyattsville. No matter the reason, it seems as though the City of Hyattsville should try and focus their efforts on teaching proper waste disposal habits on the Northern and Western areas of the city and make sure that they are receiving as much if not more attention than the Central and Eastern areas.

**Limitations**

The trash and recycling data, while providing a good picture of the whole city, are missing a few key elements. First and most importantly, without years proceeding and following the implementation of the pilot program, it is impossible to tell if the trends noted here continue. If our study period included 2008 and 2011, for example, we could tell whether there has been a general decline in trash not due to the pilot program, or if the pilot program continued to decrease the amount of trash produced by the city. We also could use recycling data in these years to show how the city has improved or not improved.

Having recycling data available on a weekly basis and separated by route could provide a more accurate picture of the city. It might be that certain places like West Hyattsville do not show any increase in recycling and that is important for the city to know to target the citizens most in need. The Waste Management Group also could not provide us with the precise route covering the city of Hyattsville, so the actual amount recycled by Hyattsville residents might be lower than the data shows. The city of Hyattsville is commonly reported to include zip codes that do not technically fall within the city's limits, so the recycling data might include these areas making the data an overestimate of the amount recycled. The recycling data also lacks composting,

electronics, and other methods of recycling that do not go through the blue toters and these numbers may explain some of the deficiencies in the city's recycling in 2010.

Litter and non-residential trash is also another unexplored area. The data does not show if there has been an increase in littering or disposing trash at businesses, work, or public dumpsters, so people might have adjusted to the pilot program by having less trash just at home, and not anywhere else. We could have also checked the city's number of foreclosures and correlated that with the amount of trash. If there were less occupied houses in 2010 as compared to 2009, then that might explain the drastic difference in residential trash amounts.

***Section 2: Survey Conclusions***

The survey was designed to assess the attitudes of Hyattsville citizens towards the pilot trash program. The survey results can be used to measure the hypothesis that residents will become more environmentally conscious as a result of the pilot program. Survey respondents provided data on various Likert Scales that revealed several trends in attitudes and opinions of respondents relative to awareness and other factors.

Analyzing responses to survey questions regarding the Pilot Program found that attitude changes were more geared towards the goal of saving money than towards helping the environment. On a five-point scale, with greater numbers indicating greater levels of agreement, the statement of "the once a week trash pick up has saved the city money" received an average rating of 3.61, while "the once a week trash pickup has made me recycle more" only received a rating of 2.54 show that money is a priority for citizens. Our sample suggests that Hyattsville residents are concerned more with what is economically beneficial over what is environmentally friendly. This might be somewhat

justified, however, as the pilot program has been shown to have saved around $87,000 (see appendix F.)

The responses to later survey questions further suggest that attitudes towards being environmentally friendly did change for some people, but not all respondents, as a result of the pilot trash program. Around 36% of the survey respondents agreed that the way that they have disposed of trash has changed over the year that the twice-a-week trash collection program was implemented. Similarly, 39% of the people answered that their recycling habits had changed over the past year. The $H_0$ of no change in people's attitudes due to the switch to once-a-week trash pick up can be rejected.

The residents who responded to the survey appear to have a lot of motivation to improve their waste management habits in theory, but lack of execution in reality. This high value that residents have for environmental awareness, in contrast to actually practicing these beliefs, is somewhat reflected in their support for the hypothetical "Zero Waste" initiative in Hyattsville and their lack of execution. These citizens are more supportive of the Zero Waste initiative than an average US resident. While around half of the survey respondents were in favor of the Zero Waste initiative, the awareness of the Zero Waste initiative in other cities was just above twenty percent. This shows their motivation for promoting environmentally friendly habits. These trends are also reflected in the establishment of the Pilot Trash program in Hyattsville. According to the surveys, there was strong support for the program to potentially be launched in Hyattsville, yet other responses mentioned above revealed that these residents seem to value convenience and economic benefits of waste management practices over environmental benefits.

The data also suggests that incomplete knowledge related to the waste reduction and recycling process may be causing the lack of emphasis on environmentally sustainable practices in Hyattsville. Many residents did not know what to do with recyclable items, from the common to the more obscure ones. The lack of knowledge on how to recycle may be due to the fact that they do not draw or care about the long-term connection of recycling and saving personal government money. When questioned on the level of importance of recycling for different goals, respondents gave the lowest Likert scale rating in the "saving you money" category. The opinions on the importance of recycling indicate that residents do not see the direct benefit of recycling and feel that it would be helpful if the city did more to help raise awareness of families. A relatively high Likert score of 3.88 shows that respondents agree the city should do more to encourage families to recycle.

The surveys reveal overall satisfaction with the pilot trash program. The majority of respondents felt that they rarely run out of either trash bins or recycling bins. One trash bin was enough for most people in the city, but if it is not enough, only 7.5% try to recycle the excess. However, residents are more likely to run out of recycle bins, and are 16.4% more likely to throw the excess recycling in the trash than they are to throw excess trash in the recycling. These responses showed a general trend of emphasis on economy and convenience over environmental sustainability. Surprisingly, despite the overall satisfaction with those aspects of the pilot trash program, only 55% of respondents believe that twice-a-week should be a permanent policy for the city.

**Limitations**

Although the surveys were useful in determination the attitudes of Hyattsville citizens, the surveys also came with limitations.

Since the survey did not follow a random sampling method, there was a likelihood of survey bias. First of all, the survey results might have reflected a degree of voluntary response bias. These survey respondents were self-selected, which means that the resulting sample might over-represent those that have strong opinions for or against the pilot trash collection program. The methods used to advertise and distribute these surveys could have also resulted in under-coverage of the target population. Most of the paper surveys were distributed at a local community event, which might have targeted certain trash routes more than others because of proximity. The event, the Hyattsville International Street Fair, was located nearest to the streets on the Tuesday, Wednesday and Thursday trash pick up routes, which included Jefferson Street, 35th Avenue, 35th Street, Hamilton Street, Queens Chapel Road, and others. Residents living closest to the fair have a higher likelihood of stopping by the event, and therefore a higher likelihood of being represented in our survey population. Furthermore, our survey's under-coverage might have also been caused by language barriers. Our survey was available only in English, while there was a large Spanish-speaking population who did not have the language skills needed to complete the survey. Also, our reliance on the online survey as the main way to administer the survey could have contributed to under-coverage. The online survey is more accessible to those families with computers in their home; the surveys might reflect the viewpoints of people who are of a higher income. The survey results may also have response bias. Since the individuals taking the survey knew that we were a research team interested in environmental practices, there was a chance that

the respondents chose answers that were more environmental-friendly than what they would have otherwise chosen.

Our analysis of the comparisons of survey responses among the different trash routes has limitations as well. Some routes did not have enough respondents to base any assumptions. For example, there were only four respondents each for the two Friday trash pick up routes. Therefore, more emphasis was placed on drawing conclusions from the scores averaged across all trash routes rather than on the scores based on the respondent's pickup day. Comparisons of the values of the coefficients of variation revealed that there was no strong correlation between the responses and the trash-pick up route that the residents lived on.

***Section 3: Conclusions from Interviews***

In summary, our respondents felt that the once-a-week pickup results in some saving costs (though not as much as anticipated), a reduction in trash and a possible increase in recycling, and ultimately fewer abusers of the pick-up system. On the other hand, our respondents noted that the once-a-week pickup is not as convenient (especially during the holiday season), and that some people are still are not aware of the procedure. During holiday season, trash output is significantly increased. So, having once-a-week often is not enough for the amount of trash put out. This is more of a problem when the pick-up day occurs before or on the holiday. For example, the trash produced on Christmas Day, might have to sit in the trash until the next week comes along. Notably, the city has taken steps to fix this problem by simply changing the trash day for holidays.

The interviewees believe there is a general increase in the recycling habits of Hyattsville citizens. However, this is just a feeling backed up by anecdotal evidence at best. Additionally, it is difficult to ascertain whether the change of behavior is due to the once-a-week program or because of the increasingly pro-recycling culture of the society. Many interviewees agreed that more could have been done to promote recycling while implementing the pilot program, but there was also a hope that a reduced trash pickup day would encourage alternate ways (like recycling) to get rid of waste.

Weighing all the pros and cons, successes and failures of the once-a-week program, the general consensus is that the program should continue. According to one of the Hyattsville council members, there really is no reason to return to twice a week because the city would then have to spend an extra $80,000 again to re-implement everything. Once-a-week has been pretty successful in accomplishing what it set out to do and there have been very few complaints about the change.

**Limitations**

Most of the interviewees probably had certain biases towards the once-a-week program as many of them are Hyattsville officials who wanted to implement the program in the first place. As a result, the perspectives may have come off a little one-sided. The officials knew very well the promotional programs they implemented to promote the pilot program but could only guess on its effectiveness in reaching the populace. The interviewees may have also had a vested interest to see the success of the pilot program, which would also affect how they perceive the program's successfulness. The one exception to this is that there were truck drivers who provided anecdotal evidence that trash had decreased and recycling had increased.

***Section 4: Conclusions from Focus Groups***

The focus and goal of the pilot program is to save money, reduce trash, and encourage recycling. Participants felt the pilot program was well-publicized, and generally was effective in reaching its goals. There are some potential problems with trash overflows during holidays and special events, but clearly it could be easily rectified with a phone call for extra containers or calling for an earlier trash picked. The attitudes and perceptions of recycling were discussed at length and raised several concerns. Apathy and knowledge was a key concern of the group, and highlighted the need for more effective information materials. It also suggested a need for more creative ways to disseminate information about trash collection and the benefits of recycling as well as expanding the group targeted for the information materials. Since all household members generate trash, it would seem intuitively appealing to engage all members of the family in the recycling effort. In this light, if trash management is a community concern, the goal should be to educate, engage and empower all members of the community in the trash reduction and recycling effort. This approach would necessarily include the city's youth, and suggests a broader effort beyond fliers on toters should be considered. Notably, the problem was compounded by the issue of language, especially in view of the growing Hispanic population. Clearly, the focus group focused our attention on the need for information materials that were language appropriate.

Ultimately, the most significant observation made by the group was that recycling does not provide a long term solution to the trash problem. This concern is particularly vexing given that the other popular alternative of landfills also did not appear to provide a

long term solution. As such, "downcycling" or a fundamental shift in consumption behavior may be the long term sustainable solution. It would seem that consuming less is the ultimate solution to reducing trash. Indeed, recent efforts to have businesses charge consumers for plastic bags is one example of how localities can reduce the amount of material that can go the trash or recycling bin. More significantly, however, is the understanding that consumption reduction would be more easily achieved if the business community were included in the process. Though this research focused on consumer trash, and recommendations for change will be more effective if one includes the business sector.

**Limitations**

Focus groups by definition are limited in size to allow participants to have an adequate opportunity to share their thoughts and views. In our case, participants of the focus group did not necessarily represent the opinions and perceptions of the general citizenry of Hyattsville. Their willingness to participate was a reflection of their awareness of the Pilot Program, their knowledge of trash management and recycling, and insight of city policies and programs. They were clearly a very environmentally conscious group. On the positive side, their knowledge and experience provided invaluable insight into the Pilot Program and the environment issues associated with trash and recycling. On the negative side, we fear that their views and comments may not reflect those of the more general public, and indeed, the concerns expresses, and solutions offered may not be shared with others. Indeed, there very willingness to participate in this focus group represented their special interest. Our focus group results would have been strengthened if we were able to schedule multiple groups reflecting multiple

interests, insight and knowledge, as well as ethnic background. It should be noted that we attempted to schedule other focus groups, but our limited resources prevented aggressively pursuing additional meetings. Though this does not dismiss the results that we garnered, it does limit our ability to generalize these findings to the rest of the population.

# Chapter 6: Overall Recommendations for the City

Considering both the qualitative and quantitative data obtained, there are some changes that the city of Hyattsville could make to further their goals of reducing trash output and increasing recycling through the pilot program. The city's trash and recycling data has shown that while there has been a decrease in trash output, the recycling rates have remained constant. What is important, however, is that residents don't feel as though their waste management habits, including both garbage and recycling, have changed. City officials and workers involved in waste management have noticed the decrease in trash, but the average citizen has not. This is part of an even bigger problem--the residents don't feel as though they know enough about recycling and believe (3.88 on a scale of 5) that the city should do more to educate. Other questions from the survey show further that the residents know that the pilot program and recycling save the city money and improve the environment, but are not aware of the direct impact it can have on their own lives.

The first step the city should take is to publicize the results of their pilot program more effectively. The only time the Hyattsville City Council publicized the sharp decline in trash output was during the debate as to whether the once a week Trash Pilot Program should remain the city's policy. The material presented during the discussions only briefly glossed over the trash data, focusing instead on the amount of money saved by the city. While this is the priority of the City Council, the residents should also know that they collectively have reduced their trash 500 tons in just one year as a means of encouragement. Most residents do not feel they have changed their habits, so by quantifying the impact they have made and the success achieved will only serve to

encourage them to continue trying to reduce their trash output. Once it has been shown that they can succeed, the residents will be more likely to improve their waste management habits and will likely be more conscientious of their decision to use the trash can or recycling bin.

The literature shows clearly that the most effective programs to reduce trash and increase recycling are ones that involve the citizens every step of the way, so the second step of the city should be to engage the residents of Hyattsville. Our focus group echoed this sentiment with suggestions including "pay as you throw" initiatives to engage the local citizen in the waste management process. While the city's effort may not need to be so extreme, there is an obvious lack of meaningful resident engagement. Getting individual residents involved will have a domino effect for the entire neighborhood. As people see their neighbors recycling they too will want to recycle. Currently, however, there is no obvious incentive for the residents to participate in a recycling program. It will take a neighborhood of recyclers to invoke a long term change in behaviors. By shifting the trash problem form the city to the individual citizen, a sense of urgency will be created resulting in visible changes in recycling habits. The change from twice a week to once a week pickup offered an opportune time to bring the issues of trash and recycling to the public consciousness. Unfortunately, this window might now be closed with the passage of time. The city's efforts during the program were largely to make sure the transition was smooth, at the expense of not placing enough emphasis educating the public.

The third and most important step of the city of Hyattsville should be to increase the effort put into educating the community about the true savings associated with

recycling. Our focus groups and surveys highlighted the lack of information the average Hyattsville citizen had about recycling. This may account for the relatively small increase in the amount of recycling observed, 23 tons, from 2009 to 2010. There is a need for a strategy targeting different elements of the city for an educational outreach program. The challenge is how best to reach all parts of diverse city, with a wide variation in the principles and practices of recycling. The city has tried to put on many events including fairs, street festivals, recycling drives, to educate the public, but have had limited results due to lack of interest and attendance. The problem does not seem to be limited to the quality of information provided, or the quantity of information disseminated. The more fundamental problem lies with getting people to pay attention. A sample flyer was posted on each recycling receptacle by Prince George's County in both English and Spanish (see appendix). Despite each home having this flyer, our surveys show that people still felt that they did not know enough about recycling. Presumably, the city needs to do more. We recommend that the city of Hyattsville employs different, more personal measures to engage the residents to take ownership of the problem.

Based on our literature review, surveys, focus groups, and interviews, we have compiled a list of possible solutions to these three main problems. There is no single method for getting Hyattsville residents to change their trash and recycling behavior. We suggest that the city encourage a coordinated multi-agency approach to include the City council, the Hyattsville Environmental Committee, local schools and non-profit organizations, as well as local businesses.

The City Council affects change from a top-down level. Though designed to facilitate widespread change, these initiatives must be targeted explicitly to the individual Hyattsville resident. The Department of Public Works, should continue to develop informational materials on trash and recycling, but seek other avenues of distributing them. There is a need for face to face interaction to complement the posting of flyers. Someone needs to gain the attention of the individual householder in order to deliver an effective message. A door to door trash and recycling educational campaign would be very successful, though costly. However, local government agencies might pool their resources with local businesses and non-profits to offer incentives to people who already go door to door including Girl Scouts or Boy Scouts to deliver material. They could also be trained to discuss the material with interested residents. Indeed, local non-profits and city agencies might work to develop materials especially to such youth groups with the hope that they bring the lessons learned back to their home. Potential information would include the successes of the city in reducing trash and increasing recycling, while also providing relevant facts including what residents can recycle and where they can learn more.

These materials should also be distributed to the elementary and middle schools so the children can take the lessons learned about positive waste management techniques back to their parents. Businesses and nonprofit organizations may also be targeted for an educational outreach "blitz". Faith institutions and the programs that they sponsor, e.g. youth groups, may also be targeted for an educational outreach effort. The Hyattsville Environmental Committee can play a significant role in producing and distributing educational materials. Agencies might pool their resources to sponsor annual events

among the local schools regarding waste management and recycling. This could range from competitions among different grades, e.g. who can recycle the most, to contests for the best poster that illustrates the costs of trash and the benefits of recycling to incorporating into class lessons the impact of trash and recycling on the environment.

Certainly, given its proximity, the city should consider the University of Maryland resources in terms of student volunteers to help promote such projects. In addition, the University can be a source of technical assistance in the design and development of trash management and recycling programs. The University can draw on its own experience as a "green" campus and share the lessons learned with city officials. Student projects will faculty support can range from developing a business or marketing plan to encourage recycling; to designing educational modules to teach children about recycling; to translating information brochures on recycling. The city has yet to leverage the University as an environmental partner. Forming a partnership could benefit both sides- providing real life experience to students and departments at the University, while also providing the city with new programs and dedicated workers who see these programs come to fruition.

Another approach is to transfer the cost of poor waste management back to the culprit. A "pay as you throw" policy would charge residents extra for producing more than a certain amount of trash per week. This would encourage residents to recycle materials to avoid the cost of trash. Alternatively, sanitation workers could enforce a penalty to residents if recycling material such as plastic bottles or paper were found in their normal garbage or simply refuse to take trash with recycling materials in it. The city could also implement mandatory recycling laws for businesses and construction

companies as enforced in San Francisco in the hopes that businesses will become "green" and the workers will adopt these changes in their homes. For example, Montgomery County stores charge shoppers a nickel for non-reusable plastic bags to encourage reuse. Having recycling appear at the forefront of all facets of life will hopefully change residents' attitudes and foster a positive change in their behavior.

In addition to trash pricing policies, the City Council should consider incentives to positively reinforce reducing trash output and increasing recycling among businesses. Businesses who comply could receive tax benefits related and certainly positive publicity from the city. For example, tax incentives might be provided to restaurants that offer recyclable or compostable carryout containers as opposed to non-recyclable landfill material. To showcase community efforts, contests could be sponsored by local agencies and businesses. For example, the city might sponsor an Environmental Awareness Week. During this time, competitions could be held among neighborhoods, for example those homes along the four different trash collection routes to see which area reduces their trash the most. The winning neighborhood would receive bragging rights and perhaps even actual prizes until the next contest. These competitions could also exist in schools to educate younger kids and to get them to consequently educate their parents. Individual homes that produce low levels of garbage could also be honored in some way like publishing their names in local newspapers or public access television. Also, events like street festivals could carry the theme of waste management to get more participants to both have fun and learn. The purpose of both the incentives and pricing is to make the citizens of the city feel involved. Simply posting flyers and having events will only target those who are already motivated, instead of pushing others to become interested.

Finally, the city needs to recognize that all these initiatives, pricing, and incentives will require more money and manpower to work effectively. The savings from switching from twice a week to once a week pickup (about $87,000) are a source of increased funds to ameliorate the city's current marketing efforts for issues related to waste management. As mentioned before, the city does have events like recycling drives, but their attendance is limited. Making "reducing, reusing, and recycling" a priority means spending more time, effort, and money to change the current system. The profits from things like a pay as you throw policy or charging for non-recyclable grocery bags may even partly fund these efforts. Overall, however, it will take more of a concerted effort on every level to get the residents of Hyattsville to produce less trash and recycle more.

This research study has looked at the global problem of trash in one city in order to find a local solution. Trash is undoubtedly a problem internationally, but the problem needs to be tackled on a smaller scale like the city of Hyattsville first before it can be addressed on a large scale. That is why it is critical to get the residents involved in sustainable efforts like the issue of waste management addressed here. Even the members of Hyattsville admit on the survey that there could be more done to encourage families to recycle. This represents a lack of knowledge at the base level, and these recommendations are aimed at furthering the effort of the City Council in reducing trash output, increasing recycling, and more permanently changing people's attitudes toward waste management. The pilot program, which changed trash pickup from twice a week to once a week is just one of the initiatives the city can implement in order to address the waste management issues.

The city of Hyattsville has benefitted from the change to once a week trash pickup, but still has to increase its effort in reaching out to the residents. The pilot program successfully reduced the total amount of trash, but negligibly affected recycling and the behaviors of the city's residents. In addition, there does not seem to be a consistent correlation between house value and trash level. Thus, the $H_0$ of no change in trash amounts is the only one that can be confidently rejected.

The mixed-method approach, while effective in analyzing the pilot program and the attitudes of the residents of Hyattsville can be improved upon. First, more data should be collected from the years after the implementation of once a week pickup to more accurately examine the effect of the change. Second, the surveys and focus groups should target a more diverse population. The respondents included more people already motivated about waste management, but this is not accurate of the general population. If we had more resources, we could have implemented a door-to-door survey that better sampled the population. Third, our study did not have a control group. If we had more data from before the pilot program or another study area that continued to have twice a week pickup, we could have used those years or that area as a basis for comparison. Finally, future studies should focus on implementation of initiatives like those outlined above, i.e. creating an intervention designed for the residents of Hyattsville. Using the same methodology, any changes in trash, recycling, or attitudes and behaviors caused by this intervention can be analyzed the same way we analyzed the pilot program. This type of research would both assist the city in its goals regarding waste management and show what type of intervention is the most effective, be it door-to-door campaigning, city-wide penalties or incentives related to trash disposal, or petitioning local schools, businesses,

faith organizations, and other non-profits. Overall, there is great potential moving forward and the findings of this study should be used as a stepping stone in achieving the goals of the city of Hyattsville.

# Appendices

## Appendix A: IRB

### UNIVERSITY OF MARYLAND, COLLEGE PARK
### Institutional Review Board
### Initial Application for Research Involving Human Subjects

**Name of Principal Investigator (PI) or** Dr. Alex Chen **Tel. No** 301-405-6798
*(NOT a student or fellow)*

**Name of Co-Investigator (Co-PI)** **Tel. No**

**E-Mail Address of PI** **E-Mail Address of Co-PI**

**Name and address of contact to receive approval documents**
Dr. Alex Chen
Office 1217 Architecture Building
University of Maryland, College Park, MD, 20742

**Tel. No**.

**Check here if this is a student master's thesis or a dissertation research project**

**Department or Unit Administering the Project** **Gemstone Program**

**Project Title** G.R.E.E.N. J.U.S.T.I.C.E.

**Funding Agency:**

**ORAA Proposal ID Number:**

**Names of any additional Federal agencies providing funds or other support for this research project:**

**Target Population:** The study population will include (Check all that apply):

- ☐ pregnant women
- ☐ minors/children
- ☐ human fetuses
- ☐ neonates
- ☐ prisoners
- ☐ students
- ☐ individuals with mental disabilities
- ☐ individuals with physical disabilities

**Exempt or Nonexempt (Optional):** You may recommend your research for exemption or nonexemption by checking the appropriate box below. For exempt recommendation, list the numbers for the exempt category(s) that apply. Refer to pages 6-7 of this document.

☐ **Exempt----List Exemption Category(s)** ***Or*** ☐ **Non-Exempt**

**If exempt, briefly describe the reason(s) for exemption.**

**Date** **Signature of Principal Investigator or Faculty Advisor**

| | |
|---|---|
| **Date** | **Signature of Co-Principal Investigator** |
| **Date** | **Signature of Student Investigator** |
| **Date** | **REQUIRED** Departmental Signature<br>**Name** _____, **Title**_____<br>***(Please also print name of person signing above)*** |

*(PLEASE NOTE: The Departmental signature block should not be signed by the investigator or the student investigator's advisor.)*

**For Internal Use Only** (to be completed by the IRB Office) Application #:

## Instructions for Completing the Application

The Departmental Signature block should be signed by the IRB Liaison or Alternate IRB Liaison unless there is a conflict of interest. If the Department or Unit does not have an IRB Liaison, the Department Head, Unit Head or Designee should sign the application.

Please provide the following information in a way that will be intelligible to non-specialists in your specific subject area.

1. **Abstract:** This research evaluates the impact of changing a city's residential trash collection from twice to once weekly on residential trash generation and waste management costs. Hyattsville, MD and its 2010 Pilot Trash Collection Program are the study's focus. Trash and costs for 2010 and 2009 are compared to determine change. We also implement and evaluate and intervention strategy designed to educate and encourage families to engage in positive waste management behavior. The intervention targets two experimental groups (high income and low income). Each group is matched to a control group (i.e. no intervention) of similar income. Pre and post intervention surveys and focus groups are conducted with residents in experimental and control groups. Responses are compared to measure the impact of the intervention. The outcome materials of the surveys and the focus groups will be stored in a locked cabinet and on a password- and firewall- protected computer. Personal and identifying information will be kept separate from survey and focus group responses and will be unable to be linked to any set of answers.

2. **Subject Selection:**

   **a.** Our target population of subjects to be sampled consists of all single-family homes participating in the Hyattsville trash collection program. The addresses of these homes are all available as part of the public record, and are recorded on the City of Hyattsville's website (http://www.hyattsville.org/). We will download these addresses into Microsoft Excel and then create a simple random sample. We will advertise the survey (see Appendix C), which will be available on the internet, to the households selected via the random sample. Fliers (please see Appendix F) will be posted in public areas and delivered

to individual houses. The fliers will direct participants to the website with the survey on it. Upon entering the site, the participant will read an introduction to the project asking for their participation in the study and a consent form (Appendix C).

**b.** The only characteristic of the subjects is that they are participants in the Hyattsville trash collection program. We will not select them on the basis of any other socioeconomic characteristic. However, the participants must all be at least 18 years old in order to sign their own consent form. Participants will be asked to confirm their age on the survey. Their participation will depend on their consent in response to an introduction wherein we ask for their participation in the project. They may comply or reject.

**c.** We would like to get a representative sample of Hyattsville to assess opinions of the trash collection program, including any differences in social or economic qualifications, so we will not try and limit our surveys to a certain population.

**d.** The total number of households participating in the trash collection program is 3,419. We aim to survey around 25% of the entire population, which is divided into 5 separate truck routes. Three of these truck routes contain more than 800 households, while two of them contain about 400. We will advertise the survey at 200 households in the three larger truck routes and 100 households in the two smaller ones, making our total 800. We hope to have about a 25% response rate so that we receive 200 surveys from the subjects chosen.

**3.** **2. Procedures:**

3. The study has two basic approaches, a survey and focus groups. They are described in detail below.

**4.**

5. Survey (Please see Appendix C):

6. The surveys will ask multiple-choice and scaled questions so they will serve as a quantitative measure of perceptions, attitudes, and opinions of the residents of our experimental and control groups. Surveys will be advertised along all five trash collection routes, including three routes that will receive intervention treatment and two that will not. After following the aforementioned subject selection procedures, we will conduct our surveys three times: once before our intervention, once after the intervention, and once after the pilot program ends. These three survey sets will be respectively labeled “pre-test”, “post-test”, and “sustainability” test. The pre-test surveys will be advertised, taken, and assessed in September of 2010. The second round of surveys scheduled for November and December 2010 will act as a posttest to see if the intervention (scheduled to take place in October 2010) changed any notions on trash or recycling. Finally, the last set of surveys scheduled for March and April 2011 will measure the residents’ overall perception of the pilot program, our intervention, and waste management mainly concerning the longevity and efficacy of both programs. Surveys have been vetted extensively to include only the most pertinent questions with a set of easily understood and distinguishable multiple-choice and scale-based responses. This will allow for maximized efficiency in regards to speed of survey and willingness to participate. The three sets of surveys will be identical and will be advertised among the same households. The list of households will be kept separate from any other materials as the goal is to measure group change, not individual change necessarily.

7.

8. The survey (please see Appendix C) will be preceded by an introduction (please see Appendix B) on the website. This will include consent.

Focus Groups (please see Appendix E)

**Timeline:**

We will have two focus groups in September (after IRB approval), before the intervention of an environmental educational outreach program. One focus group will represent the citizens from the experimental high-income trash route, and one focus group will represent the citizens from the experimental low-income trash route.

After the intervention program, we will host two additional focus groups, each one representing the people from the same routes as the first focus groups. These groups will meet in November.

We are aiming for focus groups of 7-10 people each.

**Focus group recruitment:**

As part of the Survey Introduction Script (see Appendix B) we will be asking for voluntary participation in the focus groups.

**Format:**

We will gather all of the participants into the same room and have them sign consent forms.

We will then proceed to ask the questions (Appendix E) in order to generate discussion amongst the participants and elicit honest responses.

There will be a Spanish translator present.

Each focus group will run from 70-90 minutes.

**Data Collection:**

We will have a tape recorder to record the focus group session. Each of the four sessions will be transcribed from the tape recordings. The members of our research team, as well as our mentor, will have access to the tape recordings and transcriptions. The tape recordings and transcriptions will not be released to the public.

**Location:**

To be determined. Potential locations include: Hyattsville Community Center and Langley Park Community Center

4. **Risks and Benefits:** There are no known risks to participating in this research project. Participation in this project is voluntary. This research is not designed to help subjects personally. However, the City of Hyattsville may use the research to inform future Waste Collection and Recycling decisions.

5. **Confidentiality:** All personal information will remain confidential. To protect confidentiality, only geographical identification codes will be used on surveys to assign the surveys to appropriate groups. Upon digital collection of the surveys, the researchers will separate responses and consent forms; consent forms will be stored separately from surveys to eliminate the possibility of linking any unique identifying information to the surveys. From that point on, it will be impossible to associate any survey answers with a particular individual or household. The focus groups will be audio recorded upon consent from all participants. All materials/data will be stored in a locked filing cabinet or storage area, and electronic information will be stored on a firewall- and password-protected computer. No personal information will be released. The only people who will have access to the data are the team members and the team mentor, Dr. Alex Chen.

*Team Members:*
Najeff Waseem
Blair Broser
Brendan George
Jessica Albrecht
Caleb Hii
Dane Galloway
Vy Ngyuen
Lucas Severn
Rachana Patel

6. 9. **Information and Consent Forms:** Consent forms will be required of participants in both the survey and focus group processes.
10.
11. *The survey* (please see Appendix C) will be preceded by an introduction (please see Appendix B) on the website. The introduction includes procedures for the signing of the consent form for the survey. Upon agreeing to participate, the participant will be sent to a page for the consent form and will be asked to look it over and sign it before proceeding onto the survey. (Please see survey consent form at Appendix A).

*The focus group* script (please see Appendix E) includes an introduction outlining the project; it includes a line wherein the participants are asked to look over and fill out the Focus Group Consent Form (please see Appendix D). The following is taken directly from the aforementioned Appendix E: "We will keep your identity anonymous and your responses will only be used with your consent. Before we begin the discussion, please look over and fill out these consent forms, which outline your rights as a participant in this project. (Note to proctor: hand out consent forms and pens to each participant. Allow sufficient time to examine and sign the form. Do not proceed until all forms are signed and collected.)"

7. **Conflict of Interest:** We do not foresee any potential conflicts of interest.
8. **HIPAA Compliance:** This section is not applicable.
9. **Research Outside of the United States:** This section is not applicable.
10. **Research Involving Prisoners:** This section is not applicable.

APPENDIX A: **SURVEY INFORMATION AND CONSENT FORM**

| | |
|---|---|
| **Project Title** | G.R.E.E.N. J.U.S.T.I.C.E. |
| **Why is this research being done?** | This is a research project being conducted by a team of supervised students at the University of Maryland, College Park. We are inviting you to participate in this research project because you are a resident of Hyattsville. The purpose of this research project is to assess perceptions and habits pertinent to recycling and waste collection in Hyattsville, MD |
| **What will I be asked to do?** | The procedures involve a 10-15 minutes survey. |
| **What about confidentiality?** | We will do our best to keep your personal information confidential. To help protect your confidentiality, all personal information will remain confidential. To protect your confidentiality, only geographical identification codes will be used on surveys; consent forms will be stored separately from surveys; and all materials will be stored in locked filing cabinets or storage areas, and electronic information will be protected as a password-protected file. Upon digital collection of the surveys, the researchers will separate responses and consent forms. From that point on, it will be impossible to associate any survey answers with a particular individual or household. Your responses will be used in the program analysis of the Waste Collection Pilot Program conducted by Hyattsville. However, your personal information will not be released. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law. |

| | |
|---|---|
| **What are the risks of this research?** | There are no known risks to participating in this research project. |
| **What are the benefits of this research?** | This research is not designed to help you personally. However, the City of Hyattsville may use the research to inform future Waste Collection and Recycling decisions. |
| **Do I have to be in this research?**<br>**May I stop participating at any time?** | Your participation in this research project is voluntary.<br>You may skip any questions on the survey that you may feel uncomfortable answering.<br>You may stop at any time. |

| | | |
|---|---|---|
| **What if I have questions?** | If you have questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (email) irb@deans.umd.edu; (telephone) 301-405-0678<br><br>This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects. | |
| **Statement of Age of Subject and Consent** | Your signature indicates that you are at least 18 years of age; the research has been explained to you; your questions have been fully answered; and you freely and voluntarily choose to participate in this research project. | |
| **Signature and Date** | **NAME OF SUBJECT** | |
| | **SIGNATURE OF SUBJECT** | |
| | **DATE** | |

## APPENDIX B: **INTRODUCTION TO SURVEY**

We are students from the University of Maryland working with faculty mentor Dr. Alex Chen on a research project intended to assess perceptions and habits pertinent to recycling and waste collection in Hyattsville, MD. We are also evaluating Hyattsville's current waste collection program. We have the full support of the Hyattsville mayor and city council. We are inviting you to participate in this research project because you are a resident of Hyattsville.

Would you be willing to help us by taking 10-15 minutes to fill out this survey?

Options:
A. YES (Proceed to consent form)

B. NO (Exit)

When finished: "Thank you for your time. Would you also be interested in participating in a focus group of 7-10 Hyattsville residents discussing issues of waste collection, recycling, and the environment in Hyattsville?"

G. If YES: Great! May we contact you by phone with information about the focus group in the coming weeks? Your phone number will be kept separate from the survey and consent form you just filled out.

APPENDIX C: **SURVEY**

Survey
Introduction

Participant information:

1. Are you at least 18 years old?
   A. Yes
   B. No
2. Are you a resident of Hyattsville?
   A. Yes
   B. No
3. What day of the week is your trash collected?
   A. Monday
   B. Tuesday
   C. Wednesday
   D. Thursday
   E. Friday (North Hyattsville)
   F. Friday (West Hyattsville)

Pilot Trash Collection Program

Since January, the city of Hyattsville has been collecting your trash once a week, rather than twice a week. These next few questions are meant to see if this change has affected you.

A.

| 1. First, Using the scale provided how important has this change been in: 1 Very Important 2. Important 3. Neutral 4. Somewhat important 5. Not important at all 9. Don't know | |
|---|---|
| a. Encouraging you to recycle more | |

b. Reducing air pollution in the city
a. Saving the city money (trash pickups cost less)
c. Reducing traffic congestion in your street (because of fewer trucks)
d. Helping the environment in general (e.g. need less landfill)

B.

| 5. To what extent do you agree or disagree with the following statements 1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. strongly disagree | Response |
|---|---|
| a. The city should return to a twice week trash pick up | |
| b. The once a week trash pickup has saved the city money | |
| c. The once a week trash pickup has made me recycle more | |
| d. The once a week trash pickup has reduced traffic congestion in front of my house | |
| e. The most important reason for the once a week trash pickup is to help the environment. | |
| f. Since the once a week pickup, there has been more litter on my street. | |

C. This next set of questions asks you about what you do with your trash, in terms of recycling it.

1. What do you do with the following items if you want to throw them out?
Possible responses:
**a**. throw in trash bin **b.** recycle, e.g. throw in recycling bucket, go to private or city recycling center **c.** private company pickup and removes **d.** throw in compost pile **e.** Other

| Items to "throw out" | Response |
|---|---|
| a. papers, e.g. newspaper, magazines, mail | |
| b. plastic bottles or aluminum cans | |
| c. batteries (e.g. D or car) | |
| d. clothes | |
| e. electronic equipment | |
| f. hazardous materials, e.g. paint, oil from lawn mower, etc | |
| g. food scraps, e.g. apple peels, coffee grounds | |
| h. leaves, grass, or plant or tree trimmings | |
| i. ink cartridges for printer | |
| j. glass bottles | |
| j. grass trimmings, leaves, tree waste | |

D. This next set of questions now deals with recycling.

Using the scale below, how important is recycling for:
1 Very Important 2. Important 3. Neutral 4. Somewhat important 5. Not important at all 9. Don't know
1. improving the environment
2. saving the city money
3. saving you money
4. saving landfill space (used for trash)
5. improving air quality
6. using natural resources more effectively
7. creating jobs
8. creating a strong U.S. economy
9. Other

E.

To what extent do you agree with the following statements about recycling?
1. strongly agree 2. agree 3. neutral 4. disagree 5. strongly disagree
1. Recycling raises the price of goods and services
2. Most people would like to recycle more but feel it is too much trouble
3. Recycling is a messy and dirty business

4. There are less expensive ways to save the environment
5. Most people would like to recycle more but don't know how
6. Most people would like to compost but don't know how
7. Recycling is directly related to the health of the U.S. Economy
8. There is a need for everyone to increase the amount they recycle.

| | |
|---|---|
| 9. The city should do more to encourage families to recycle | |
| 10. Most people would like to recycle more but feel it takes too much time | |
| 11. Most people would like to recycle more but need more information | |

F.
For most people, recyclable materials include paper, plastic, aluminum cans, glass, and food.

On average what percentage of your recycled materials is: (should add up to 100%)

| | |
|---|---|
| Paper | |
| Plastic | |
| Aluminum | |
| Food | |
| Glass | |
| Other: | |

100%

G.
Zero Waste is a name given to attempts by cities to reach 0% Waste Production or 100% recycling within the next 20 years.

1. Have you ever heard about Zero Waste?
    1. Yes
    2. No
    3. Maybe
    4. Don't know

2. Do you think Zero Waste is a good idea?
    1. Yes
    2. No
    3. Maybe
    4. Don't know
3. Do you think the city of Hyattsville could achieve 100% recycling within 20 years?
    1. Yes
    2. No
    3. Maybe
    4. Don't know

H.
1. On an average, how many trash bins do you fill per week?

_____

2. How frequently do you run out of trash bins?
1. Very frequently 2. Frequently 3. Sometimes 4. Rarely 5. Never

4. What are you most likely to do if you do not have enough trash bins?
a. Recycle it
b. Overfill the trash bin
c. Save my trash for the next pickup
d. Ask for more trash bins
e. Other _____

3. On average, how many *recycling* bins do you fill per week?

4. How frequently do you run out of recycling bins?
1. Very frequently 2. Frequently 3. Sometimes 4. Rarely 5. Never

5. What are you most likely to do if you do not have enough recycling bins?
a. Throw it in the trash
b. Overfill the recycle bin
c. Save the recyclable for the next pickup
d. Other

| | | | |
|---|---|---|---|
| 6. In the past year, has how you dispose of trash changed? | YES | NO | DK |
| 7. Do you feel you have enough trash bins? | YES | NO | DK |
| 8. Do you feel you have enough recycling bins? | YES | NO | DK |
| 8. In the past year, have your recycling habits changed? | YES | NO | DK |
| 10. Do you know where the City's recycling drop-off center is located? | YES | NO | DK |
| 11. Do you know where your city's recycling center is? | YES | NO | DK |
| 12. Should the once a week trash pickup become a permanent policy for the city? | YES | NO | DK |
| 13. Would you like more information about recycling? | YES | NO | DK |

Finally, how long have you lived in your home? _____

You have been very helpful.

Additional questions:

1. *Would you also be interested in participating in a focus group of 7-10 Hyattsville residents discussing issues of waste collection, recycling, and the environment in Hyattsville?*

A. Yes
Phone number or email address we can contact with focus group information (all contact info will be kept separate from survey responses): _____
B. No

## APPENDIX D: **FOCUS GROUP CONSENT FORM**

| | |
|---|---|
| **Project Title** | G.R.E.E.N. J.U.S.T.I.C.E. |
| **Why is this research being done?** | This is a research project being conducted by a team of supervised students at the University of Maryland, College Park. We are inviting you to participate in this research project because you are a resident of Hyattsville. The purpose of this research project is to assess perceptions and habits pertinent to recycling and waste collection in Hyattsville, MD |
| **What will I be asked to do?** | The focus group will run from 70-90 minutes. The participants will be gathered in a room to discuss their attitudes on the pilot trash collection program and waste management. The discussion will be guided by a series of probe questions. |

| | |
|---|---|
| **What about confidentiality?** | All personal information will remain confidential. To protect your confidentiality, the identity of the participants, session recordings, and transcriptions will not be released to the public; consent forms will be stored separately from the recordings and transcriptions; and all materials will be stored in a locked filing cabinet, and electronic information will be protected as a password-protected file. Upon completion of the focus group session, the researchers will separate responses and consent forms. From that point on, it will be impossible to associate any answers with a particular individual or household. If a paper or article is published based on this research, all personal information will remain confidential and will be protected. In accordance with legal requirements and/or professional standards, we will disclose to the appropriate individuals and/or authorities information that comes to our attention concerning child abuse or neglect or potential harm to you or others.<br>This research project involves making an audio recording.<br>___ *I agree to be [audio recorded] during my participation in this study.*<br>___ *I do not agree to be [audio recorded] during my participation in this study.* |

| | |
|---|---|
| **What are the risks of this research?** | There are no known risks to participating in this research project. |
| **What are the benefits of this research?** | This research is not designed to help you personally. However, the City of Hyattsville may use the research to inform future Waste Collection and Recycling decisions. |
| **Do I have to be in this research?May I stop participating at any time?** | Your participation in this research project is voluntary. You may skip any questions that you may feel uncomfortable answering. You may withdraw at any time. |

| | |
|---|---|
| **What if I have questions?** | If you have questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (email) irb@deans.umd.edu; (telephone) 301-405-0678<br>This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects. |

| | | |
|---|---|---|
| **Statement of Age of Subject and Consent** | Your signature indicates that you are at least 18 years of age; the research has been explained to you; your questions have been fully answered; and you freely and voluntarily choose to participate in this research project. | |
| **Signature and Date** | **NAME OF SUBJECT** | |
| | **SIGNATURE OF SUBJECT** | |
| | **DATE** | |

## APPENDIX E: **FOCUS GROUP SCRIPT**

**Introduction:**

Hello, residents of Hyattsville! We are students at the University of Maryland who are part of a research team exploring Hyattsville's pilot trash collection program. We are hosting a focus group today to learn more about your views on the switch between twice a week to once a week trash collection pickup, as well as general environmental attitudes. Please feel free to elaborate and give your honest opinion during the discussion. We will keep your identity anonymous and your responses will only be used with your consent. Before we begin the discussion, please look over and fill out these consent forms, which outline your rights as a participant in this project. (Note to proctor: hand out consent forms and pens to each participant. Allow sufficient time to examine and sign the form. Do not proceed until all forms are signed and collected.)

**Questions:**

1. How do you feel about the change from 1x per week to 2x per week trash pickup?
    - **a.** Why do you think the city implemented this change?
    - **b.** Were you aware of the city discussions prior to the change being made? Did you participate in such discussions? Why or why not?
    - **c.** Has the change affected how you handle your trash? In what way? Why or why not?
    - **d.** Has the change affected how you handle your recycling? Why or why not?
    - **e.** Do you think the amount of weekly trash you throw out has changed? Why or why not?
    - **f.** Do you think that you are recycling more?
    - **g.** Do you think there is more litter on the street since the change went into effect?
2. We are interested in your thoughts about trash and recycling.
    a. How much trash do you think the city generates per year?
    b. How much of a problem do you think trash is to the city? To the county? Why?
    c. How much trash do you think the county generates per year?
    d. Do you think trash is a problem for the city? In what way?
    e. Do you think people recycle as much as they should? Why or why not?
    f. Do you know where your local recycling center is?
    g. How do you handle bulk pickups, e.g. refrigerators?
    h. Do you or any of your neighbors compost?
    i. The following are items that are traditionally found in the home. Would I find these items in your trash container or your recyclables container?
        i. Food
        ii. Clothes

iii. Paper
iv. Plastic
v. Electronics and related items, e.g. printers and inks, batteries, computers
vi. Metals, e.g. bicycles

3. Finally, there is movement that challenges communities to achieve zero waste.
    a. Do you think this is possible? Why or why not?
    b. Would you participate in a program designed to reach zero waste in Hyattsville?

We will ask follow up questions as needed.

APPENDIX F: **PUBLICITY FLIER FOR SURVEY**

Page 1 of Flier:

## Background

Green Justice is a team of students who for the past two years have been examinng the issue of trash and the environment. During our studies, we came across Hyattsville's recent policy to change from a twice a week to a once a week pickup schedule in an effort to reduce trash in the city. We felt that we could make an important contribution to the city, by evaluating the effectiveness of the program in terms of changing people's behavior about trash. With the support and cooperation of both the Hyattsville City Council and the Hyattsville Sustainability Group, we have chosen to conduct a survey of residents regarding their views on trash. We will be at public events and meetings and ask that you take a few minutes to complete the survey. If you do not have the time, please answer the same survey on-line, just go to:

Www.surveymonkey.xxxxx

We will share the results as they become available. Thanks you for time and consideration and helping to make Hyattsville a cleaner place to live.

Thank you
for your help

Look for us
at your next
community event

GREEN JUSTICE
IN
HYATTSVILLE, MD

"Trash in the City"
A Survey

For more information go to our website:
http://teams.gemstone.umd.edu/classof2012/greenjustice/
Email us at:
umdgreenjustice@gmail.com .
Go to the On-Line Survery:
www.surveymonkey.....

Page 2 of Flier:

## Who We Are

Green Justice are students from the University of Maryland concerned with trash and its cost to cities. We are interested in what can be done to promote reusing, recycling and reducing “stuff we throw away”.

This year, Hyattsville changed its Trash Pickup from twice to once a week as a means to reduce trash in the city. Has this change made a difference? We hope to find this out.

Through surveys and an analysis of other data we will to measure people’s behaviors and views about trash. To complement our surveys we will be developing our own materials to educate the public about what to do with trash.

The results of our efforts will be shared with residents to help plan future ways to reduce the amount of trash in Hyattsville.

## The Survey

In cooperation with the Hyattsville Sustainability Committee and support from the Hyattsville City Council, we will be conducting surveys throughout the city to find out your behaviors and views about trash. Please look for us, it will only take a few minutes.

The survey results will be used to help design strategies to promote reduction, recycling and reusing of materials usually found in the trash.

The same survey is available online at www.xxxx.org. We hope that you take the time to fill out the survey, either in person or on line.

## The Problem

According to EPA, from 1960 to 2007, the amount of stuff that Americans threw away nearly doubled from 2.7 pounds per person daily to 4.6 pounds. As a result, In 2007, we produced 254.1 million tons of household trash. Of this, less than 90 million tons were recycled or composted, while 32 million tons were burned, and over 137 million tons wound up in landfills. Burning results in more pollutants in our air and water, while it has been estimated that the landfills will be full in 20 years. (Washington Post, March 14, 2009).

**Look for Us !!!**
**or go to our**
**On line Survey**
**www.surveymonkey...**

## Appendix B: Survey Questions

Participant information:

- Are you at least 18 years old?
  - Yes
  - No

2. Are you a resident of Hyattsville?
   1) Yes
   2) No

- What day of the week is your trash collected?
  1 Monday
  2 Tuesday
  3 Wednesday
  4 Thursday
  5 Friday (North Hyattsville)
  6 Friday (West Hyattsville)

Pilot Trash Collection Program

Since January, the city of Hyattsville has been collecting your trash once a week, rather than twice a week. These next few questions are meant to see if this change has affected you.

A.

| 1. First, Using the scale provided how important has this change been in: 1 Very Important 2. Important 3. Neutral 4. Somewhat important 5. Not important at all 9. Don't know | |
|---|---|
| a. Encouraging you to recycle more | |
| b. Reducing air pollution in the city | |
| a. Saving the city money (trash pickups cost less) | |
| c. Reducing traffic congestion in your street (because of fewer trucks) | |
| d. Helping the environment in general (e.g. need less landfill) | |

B.

| 5. To what extent do you agree or disagree with the following statements 1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree | Response |
|---|---|
| a. The city should return to a twice week trash pick up | |
| b. The once a week trash pickup has saved the city money | |
| c. The once a week trash pickup has made me recycle more | |
| d. The once a week trash pickup has reduced traffic congestion in front of my house | |
| e. The most important reason for the once a week trash pickup is to help the environment. | |

| | |
|---|---|
| f. Since the once a week pickup, there has been more litter on my street. | |

C. This next set of questions asks you about what you do with your trash, in terms of recycling it.

1. What do you do with the following items if you want to throw them out?
Possible responses:
**a**. throw in trash bin **b.** recycle, e.g. throw in recycling bucket, go to private or city recycling center **c.** private company pickup and removes **d.** throw in compost pile **e.** Other

| Items to "throw out" | Response |
|---|---|
| a. papers, e.g. newspaper, magazines, mail | |
| b. plastic bottles or aluminum cans | |
| c. batteries (e.g. D or car) | |
| d. clothes | |
| e. electronic equipment | |
| f. hazardous materials, e.g. paint, oil from lawn mower, etc | |
| g. food scraps, e.g. apple peels, coffee grounds | |
| h. leaves, grass, or plant or tree trimmings | |
| i. ink cartridges for printer | |
| j. glass bottles | |
| j. grass trimmings, leaves, tree waste | |

D. This next set of questions now deals with recycling.

Using the scale below, how important is recycling for:
1 Very Important 2. Important 3. Neutral 4. Somewhat important 5. Not important at all 9. Don't know

| | |
|---|---|
| 1. improving the environment | |
| 2. saving the city money | |
| 3. saving you money | |
| 4. saving landfill space (used for trash) | |
| 5. improving air quality | |
| 6. using natural resources more effectively | |
| 7. creating jobs | |
| 8. creating a strong U.S. economy | |

| | |
|---|---|
| 9. Other | |

E.

To what extent do you agree with the following statements about recycling?
1. strongly agree 2. agree 3. neutral 4. disagree 5. strongly disagree

| | |
|---|---|
| 1. Recycling raises the price of goods and services | |
| 2. Most people would like to recycle more but feel it is too much trouble | |
| 3. Recycling is a messy and dirty business | |
| 4. There are less expensive ways to save the environment | |
| 5. Most people would like to recycle more but don't know how | |
| 6. Most people would like to compost but don't know how | |
| 7. Recycling is directly related to the health of the U.S. Economy | |
| 8. There is a need for everyone to increase the amount they recycle. | |

9. The city should do more to encourage families to recycle
10. Most people would like to recycle more but feel it takes too much time
11. Most people would like to recycle more but need more information

F.
For most people, recyclable materials include paper, plastic, aluminum cans, glass, and food.

On average what percentage of your recycled materials is: (should add up to 100%)

| | |
|---|---|
| Paper | |
| Plastic | |
| Aluminum | |
| Food | |
| Glass | |
| Other: | |
| | 100% |

G.
Zero Waste is a name given to attempts by cities to reach 0% Waste Production or 100% recycling within the next 20 years.

1. Have you ever heard about Zero Waste?
    1. Yes
    2. No
    3. Maybe
    4. Don't know

2. Do you think Zero Waste is a good idea?
    1. Yes
    2. No
    3. Maybe
    4. Don't know
3. Do you think the city of Hyattsville could achieve 100% recycling within 20 years?
    1. Yes
    2. No
    3. Maybe
    4. Don't know

H.
1. On an average, how many trash bins do you fill per week?

_____

2. How frequently do you run out of trash bins?
    1. Very frequently 2. Frequently 3. Sometimes 4. Rarely 5. Never

4. What are you most likely to do if you do not have enough trash bins?
  a. Recycle it
  b. Overfill the trash bin
  c. Save my trash for the next pickup
  d. Ask for more trash bins
  e. Other _____

3. On average, how many *recycling* bins do you fill per week?

4. How frequently do you run out of recycling bins?
    1. Very frequently 2. Frequently 3. Sometimes 4. Rarely 5. Never

5. What are you most likely to do if you do not have enough recycling bins?
    a. Throw it in the trash
    b. Overfill the recycle bin
    c. Save the recyclable for the next pickup
    d. Other

| | | | |
|---|---|---|---|
| 6. In the past year, has how you dispose of trash changed? | YES | NO | DK |
| 7. Do you feel you have enough trash bins? | YES | NO | DK |
| 8. Do you feel you have enough recycling bins? | YES | NO | DK |
| 8. In the past year, have your recycling habits changed? | YES | NO | DK |
| 10. Do you know where the City's recycling drop-off center is located? | YES | NO | DK |
| 11. Do you know where your city's recycling center is? | YES | NO | DK |
| 12. Should the once a week trash pickup become a permanent policy for the city? | YES | NO | DK |
| 13. Would you like more information about recycling? | YES | NO | DK |

Finally, how long have you lived in your home? _____

You have been very helpful.

Additional questions:

1. *Would you also be interested in participating in a focus group of 7-10 Hyattsville residents discussing issues of waste collection, recycling, and the environment in Hyattsville?*

A. Yes
   Phone number or email address we can contact with focus group information (all contact info will be kept separate from survey responses): _____
B. No

## Appendix C: Survey Responses

## I. SURVEY DATA

### Table C.1. Importance of change in trash collection program

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Encouraging you to recycle more | 2.70 | 2.67 | 3.00 | 2.48 | 3.25 | 1.75 |
| Reducing air pollution in the city | 3.21 | 3.06 | 3.30 | 3.44 | 3.25 | 2.00 |
| Saving the city money (trash pickups cost less) | 3.69 | 3.29 | 3.70 | 3.80 | 3.50 | 4.25 |
| Reducing traffic congestion in your street (because of fewer trucks) | 3.19 | 2.39 | 3.67 | 3.20 | 4.25 | 3.50 |
| Helping the environment in general (e.g. need less landfill) | 3.39 | 3.00 | 4.20 | 3.30 | 3.00 | 2.75 |

Not Important at All = 1 point

Somewhat Important = 2 points

Neutral = 3 points

Important = 4 points

Very Important =5 points

Scale: “(1)Not important at all”, “(2) Somewhat important”, “(3) Neutral”, “(4)Important”, or “(5) Very important”, or “(0) Not applicable.”

**Table C.2. To what extent do you agree or disagree with the following statements:**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| The city should return to a twice week trash pick up | 2.53 | 2.67 | 2.00 | 2.38 | 1.75 | 4.00 |
| The once a week trash pickup has saved the city money | 3.61 | 3.00 | 4.60 | 3.86 | 3.50 | 4.00 |
| The once a week trash pickup has made me recycle more | 2.54 | 2.50 | 5.00 | 3.14 | 2.25 | 1.75 |
| The once a week trash pickup has reduced traffic congestion in front of my house | 2.83 | 2.17 | 4.70 | 3.30 | 3.50 | 3.00 |
| The most important reason for the once a week trash pickup is to help the environment. | 3.02 | 3.06 | 4.60 | 3.38 | 2.75 | 1.75 |
| Since the once a week pickup, there has been more litter on my street. | 2.68 | 3.28 | 3.70 | 2.86 | 3.00 | 3.33 |

Scale: "(1) Strongly Disagree", "(2) Disagree", "(3) Neutral", "(4)Agree", or "(5) Strongly Agree"

**Table C.3. How important is recycling for:**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Improving the environment | 4.56 | 4.60 | 4.80 | 4.52 | 3.75 | 4.75 |
| Saving the city money | 4.16 | 4.21 | 4.40 | 3.95 | 3.75 | 3.75 |
| Saving you money | 3.60 | 3.29 | 4.44 | 3.45 | 3.50 | 3.00 |
| Saving landfill space (used for trash) | 4.47 | 4.60 | 4.90 | 4.19 | 4.00 | 4.50 |
| Improving air quality | 4.21 | 4.13 | 4.60 | 4.15 | 3.75 | 4.25 |
| Using natural resources more effectively | 4.41 | 4.53 | 4.70 | 4.30 | 3.75 | 4.00 |
| Creating jobs | 3.77 | 3.29 | 4.40 | 3.67 | 3.75 | 3.25 |
| Creating a strong U.S. economy | 3.80 | 3.43 | 4.33 | 3.76 | 3.00 | 3.25 |
| Other | 3.61 | 3.00 | 5.00 | 3.29 | 3.75 | 4.00 |

Scale: "(1)Not important at all", "(2) Somewhat important", "(3) Neutral", "(4) Important", or "(5) Very important", or "(0) Not applicable."

## Table C.4. To what extent do you agree:

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Recycling raises the price of goods and services | 2.41 | 1.80 | 2.20 | 2.62 | 2.50 | 2.75 |
| Most people would like to recycle more but feel it is too much trouble | 3.46 | 3.73 | 3.50 | 3.43 | 2.00 | 3.25 |
| Recycling is a messy and dirty business | 2.05 | 2.21 | 1.60 | 2.19 | 2.25 | 2.25 |
| There are less expensive ways to save the environment | 2.37 | 2.13 | 2.10 | 2.67 | 2.00 | 3.25 |
| Most people would like to recycle more but don't know how | 3.25 | 2.93 | 4.20 | 3.24 | 2.00 | 3.25 |
| Most people would like to compost but don't know how | 3.20 | 3.27 | 3.40 | 3.29 | 2.75 | 3.50 |
| Recycling is directly related to the health of the U.S. Economy | 3.17 | 3.13 | 3.80 | 3.14 | 2.25 | 2.75 |
| There is a need for everyone to increase the amount they recycle. | 3.93 | 4.27 | 4.50 | 3.71 | 2.50 | 4.75 |
| The city should do more to encourage families to recycle | 3.88 | 4.20 | 4.50 | 3.71 | 2.75 | 3.75 |
| Most people would like to recycle more but feel it takes too much time | 3.25 | 3.33 | 3.80 | 3.10 | 2.00 | 3.50 |
| Most people would like to recycle more but need more information | 3.29 | 3.27 | 3.70 | 3.33 | 2.25 | 3.50 |

Scale: "(1)Not important at all", "(2) Somewhat important", "(3) Neutral", "(4) Important", or "(5) Very important", or "(0) Not applicable."

## Table C.5. Have you ever heard of Zero Waste?

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Yes | 23.7% | 31.3% | 30.0% | 23.8% | 0.0% | 33.3% |
| No | 59.3% | 62.5% | 40.0% | 66.7% | 75.0% | 33.3% |
| Maybe | 13.6% | 6.3% | 20.0% | 9.5% | 0.0% | 33.3% |
| Don't know | 3.4% | 0.0% | 10.0% | 0.0% | 25.0% | 0.0% |

**Table C.6. Do you think Zero Waste is a good idea?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Yes | 50.8% | 43.8% | 70.0% | 47.6% | 50.0% | 66.7% |
| No | 10.2% | 12.5% | 0.0% | 19.0% | 0.0% | 0.0% |
| Maybe | 15.3% | 18.8% | 10.0% | 4.8% | 25.0% | 33.3% |
| Don't know | 23.7% | 25.0% | 20.0% | 28.6% | 25.0% | 0.0% |

**Table C.7. Do you think the city of Hyattsville could achieve 100% recycling within 20 years?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Yes | 29.3% | 18.8% | 22.2% | 42.9% | 25.0% | 0.0% |
| No | 32.8% | 31.3% | 44.4% | 23.8% | 50.0% | 66.7% |
| Maybe | 29.3% | 31.3% | 33.3% | 23.8% | 25.0% | 33.3% |
| Don't know | 8.6% | 18.8% | 0.0% | 9.5% | 0.0% | 0.0% |

**Table C.8. Number of trash bins per week**

| Number of Trash bins (x) | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| $x \leq 1$ | 80% | 81% | 89% | 84% | 75% | 33% |
| $1 < x \leq 2$ | 10% | 19% | 0% | 11% | 0% | 0% |
| $2 < x \leq 3$ | 2% | 0% | 0% | 0% | 0% | 33% |
| $x > 3$ | 8% | 0% | 11% | 5% | 25% | 33% |
| **Total Responses** | 51 | 16 | 9 | 19 | 4 | 3 |

**Table C.9. How frequently do you run out of trash bins?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Very frequently | 5% | 0.0% | 11.1% | 0.0% | 0.0% | 33.3% |
| Frequently | 7% | 6.3% | 11.1% | 10.0% | 0.0% | 0.0% |
| Sometimes | 18% | 31.3% | 0.0% | 10.0% | 25.0% | 33.3% |
| Rarely | 16% | 12.5% | 33.3% | 10.0% | 25.0% | 0.0% |
| Never | 54% | 50.0% | 44.4% | 70.0% | 50.0% | 33.3% |

**Table C.10. What are you most likely to do if you do not have enough trash bins?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Recycle it | 7.5% | 6.3% | 11.1% | 5.9% | 25.0% | 0.0% |
| Overfill the trash bin | 28.3% | 43.8% | 0.0% | 29.4% | 25.0% | 33.3% |
| Save my trash for the next pickup | 34.0% | 25.0% | 55.6% | 35.3% | 25.0% | 33.3% |
| Ask for more trash bins | 11.3% | 6.3% | 0.0% | 23.5% | 25.0% | 0.0% |
| Other | 18.9% | 18.8% | 33.3% | 5.9% | 0.0% | 33.3% |

**Table C.11 How many recycling bins do you fill per week?**

| Number of Trash bins (x) | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| $x \leq 1$ | 82% | 93% | 67% | 85% | 75% | 67% |
| $1 < x \leq 2$ | 14% | 7% | 22% | 15% | 0% | 33% |
| $2 < x \leq 3$ | 0% | 0% | 0% | 0% | 0% | 0% |
| $x > 3$ | 4% | 0% | 11% | 0% | 25% | 0% |
| **Total Responses** | 51 | 16 | 9 | 19 | 4 | 3 |

**Table C.12. How frequently do you run out of recycling bins?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Very frequently | 11.1% | 0.0% | 11.1% | 15.0% | 25.0% | 50.0% |
| Frequently | 11.1% | 13.3% | 11.1% | 10.0% | 25.0% | 0.0% |
| Sometimes | 25.9% | 33.3% | 33.3% | 20.0% | 0.0% | 50.0% |
| Rarely | 25.9% | 26.7% | 22.2% | 30.0% | 0.0% | 0.0% |
| Never | 25.9% | 26.7% | 22.2% | 25.0% | 50.0% | 0.0% |

**Table C.13. What are you most likely to do if you do not have enough recycling bins?**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Throw it in the trash | 16.4% | 13.3% | 0.0% | 15.0% | 0.0% | 66.7% |
| Overfill the recycle bin | 21.8% | 26.7% | 22.2% | 25.0% | 0.0% | 33.3% |
| Save the recyclable for the next pickup | 49.1% | 46.7% | 55.6% | 55.0% | 75.0% | 0.0% |
| Other | 12.7% | 13.3% | 22.2% | 5.0% | 25.0% | 0.0% |

**Table C.14. How long have you lived in your home?**

| Number of Years | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Less than 5 | 40% | 38% | 40% | 38% | 33% | 67% |
| 5 - 10 | 25% | 25% | 20% | 19% | 67% | 33% |
| More than 10 | 36% | 38% | 40% | 43% | 0% | 0% |
| **Total Responses** | 53 | 16 | 10 | 21 | 3 | 3 |

**Table C.15. Percent of respondents who answered "Yes"**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| In the past year, has how you dispose of trash changed? | 36% | 19% | 50% | 48% | 50% | 33% |
| Do you feel you have enough trash bins? | 79% | 75% | 100% | 86% | 50% | 33% |
| Do you feel you have enough recycling bins? | 69% | 75% | 80% | 57% | 50% | 67% |
| In the past year, have your recycling habits changed? | 39% | 27% | 44% | 43% | 75% | 33% |
| Do you know where the City's recycling drop-off center is located? | 41% | 44% | 50% | 38% | 75% | 33% |
| Do you know where your city's recycling center is? | 31% | 31% | 50% | 29% | 25% | 33% |
| Should the once a week trash pickup become a permanent policy for the city? | 55% | 44% | 70% | 62% | 75% | 33% |
| Would you like more information about recycling? | 28% | 38% | 22% | 29% | 50% | 0% |

## Table C.16. Percent of respondents who answered "No"

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| In the past year, has how you dispose of trash changed? | 59% | 81% | 40% | 48% | 50% | 67% |
| Do you feel you have enough trash bins? | 21% | 25% | 0% | 14% | 50% | 67% |
| Do you feel you have enough recycling bins? | 29% | 25% | 10% | 43% | 50% | 33% |
| In the past year, have your recycling habits changed? | 59% | 73% | 44% | 57% | 25% | 67% |
| Do you know where the City's recycling drop-off center is located? | 52% | 50% | 40% | 52% | 25% | 67% |
| Do you know where your city's recycling center is? | 62% | 63% | 40% | 62% | 75% | 67% |
| Should the once a week trash pickup become a permanent policy for the city? | 33% | 44% | 20% | 29% | 0% | 67% |
| Would you like more information about recycling? | 65% | 63% | 67% | 62% | 50% | 100% |

## Table C.17. Percent of respondents who answered "Don't Know"

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| In the past year, has how you dispose of trash changed? | 5% | 0% | 10% | 5% | 0% | 0% |
| Do you feel you have enough trash bins? | 0% | 0% | 0% | 0% | 0% | 0% |
| Do you feel you have enough recycling bins? | 2% | 0% | 10% | 0% | 0% | 0% |
| In the past year, have your recycling habits changed? | 2% | 0% | 11% | 0% | 0% | 0% |
| Do you know where the City's recycling drop-off center is located? | 7% | 6% | 10% | 10% | 0% | 0% |
| Do you know where your city's recycling center is? | 7% | 6% | 10% | 10% | 0% | 0% |
| Should the once a week trash pickup become a permanent policy for the city? | 12% | 13% | 10% | 10% | 25% | 0% |
| Would you like more information about recycling? | 7% | 0% | 11% | 10% | 0% | 0% |

## II. COEFFICIENT OF VARIATION

First, standard deviations of the mean values for each statement were calculated. For example, the statement "How important has this change been in encouraging you to recycle more" had an average value of 2.70 and a standard deviation of 1.49 for all of Hyattsville. The standard deviations were then divided by the average value to get a coefficient of variation of 0.55.

**Table C.18. Importance of change in trash collection program**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Encouraging you to recycle more | 0.55 | 0.63 | 0.47 | 0.55 | 0.15 | 1.17 |
| Reducing air pollution in the city | 0.46 | 0.50 | 0.38 | 0.32 | 0.46 | 1.00 |
| Saving the city money (trash pickups cost less) | 0.42 | 0.49 | 0.44 | 0.35 | 0.55 | 8.50 |
| Reducing traffic congestion in your street (because of fewer trucks) | 0.44 | 0.58 | 0.26 | 0.44 | 0.12 | 1.83 |
| Helping the environment in general (e.g. need less landfill) | 0.46 | 0.54 | 0.31 | 0.38 | 0.61 | 1.61 |

**Table C.19. To what extent do you agree or disagree with the following statements:**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| The city should return to a twice week trash pick up | 0.63 | 0.64 | 0.87 | 0.59 | 0.55 | 0.35 |
| The once a week trash pickup has saved the city money | 0.31 | 0.44 | 0.22 | 0.23 | 0.37 | 0.20 |
| The once a week trash pickup has made me recycle more | 0.53 | 0.64 | 0.38 | 0.50 | 0.43 | 0.33 |
| The once a week trash pickup has reduced traffic congestion in front of my house | 0.40 | 0.51 | 0.23 | 0.39 | 0.16 | 0.27 |
| The most important reason for the once a week trash pickup is to help the environment. | 0.45 | 0.45 | 0.38 | 0.43 | 0.62 | 0.55 |
| Since the once a week pickup, there has been more litter on my street. | 0.51 | 0.55 | 0.61 | 0.53 | 0.27 | 0.46 |

**Table C.20. How important is recycling for:**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Improving the environment | 0.16 | 0.14 | 0.09 | 0.18 | 0.34 | 0.11 |
| Saving the city money | 0.22 | 0.17 | 0.16 | 0.30 | 0.26 | 0.00 |
| Saving you money | 0.35 | 0.39 | 0.20 | 0.35 | 0.40 | 0.77 |
| Saving landfill space (used for trash) | 0.21 | 0.14 | 0.06 | 0.31 | 0.35 | 0.13 |
| Improving air quality | 0.20 | 0.12 | 0.15 | 0.22 | 0.26 | 0.35 |
| Using natural resources more effectively | 0.22 | 0.16 | 0.14 | 0.28 | 0.15 | 0.35 |
| Creating jobs | 0.33 | 0.42 | 0.19 | 0.38 | 0.15 | 0.27 |
| Creating a strong U.S. economy | 0.33 | 0.44 | 0.20 | 0.34 | 0.27 | 0.27 |
| Other | 0.16 | 0.14 | 0.09 | 0.18 | 0.34 | 0.11 |

**Table C.21. To what extent do you agree:**

| Answer Options | All | Tuesday | Wednesday | Thursday | Friday (N) | Friday (W) |
|---|---|---|---|---|---|---|
| Recycling raises the price of goods and services | 0.46 | 0.48 | 0.42 | 0.43 | 0.52 | 0.46 |
| Most people would like to recycle more but feel it is too much trouble | 0.31 | 0.19 | 0.39 | 0.29 | 0.41 | 0.53 |
| Recycling is a messy and dirty business | 0.42 | 0.25 | 0.53 | 0.42 | 0.67 | 0.67 |
| There are less expensive ways to save the environment | 0.47 | 0.39 | 0.69 | 0.40 | 0.41 | 0.46 |
| Most people would like to recycle more but don't know how | 0.35 | 0.30 | 0.22 | 0.31 | 0.71 | 0.46 |
| Most people would like to compost but don't know how | 0.33 | 0.27 | 0.35 | 0.31 | 0.55 | 0.29 |
| Recycling is directly related to the health of the U.S. Economy | 0.31 | 0.27 | 0.21 | 0.31 | 0.43 | 0.35 |
| There is a need for everyone to increase the amount they recycle. | 0.28 | 0.16 | 0.16 | 0.33 | 0.69 | 0.11 |
| The city should do more to encourage families to recycle | 0.28 | 0.22 | 0.16 | 0.31 | 0.55 | 0.34 |
| Most people would like to recycle more but feel it takes too much time | 0.33 | 0.20 | 0.19 | 0.27 | 0.76 | 0.16 |
| Most people would like to recycle more but need more information | 0.34 | 0.32 | 0.31 | 0.35 | 0.56 | 0.29 |

## Appendix D: Interview Scripts

### *Script used during interviews with city officials:*

Hello, we are (your names). We wanted to talk to you today to find out your perspective on Hyattsville's Pilot Trash program and if it has had a positive impact for the city.

1. Why do you think Hyattsville decided to start the pilot trash program? (if more than one, ask what is most important)
2. Do you think that waste reduction is an issue of concern for Hyattsville?
3. Do you feel that the majority of Hyattsville citizens were informed of this program and its start date?
4. Do you think that the pilot trash program had an effect on trash output in Hyattsville?
5. Earlier, you stated that Hyattsville decided to start the pilot trash program to (fill in here). Do you think these goals have been accomplished by the program?
6. What do you feel were the positive results of the program? What do you think were the negative results of the program?
7. In your opinion, how could the negative results of the program be addressed?
8. In your opinion, should the pilot trash program continue?

We are also trying to study the correlation between the pilot program and its effect on recycling. We would like your opinions on the recycling behaviors of Hyattsville citizens.

1. In general, why do you think people recycle (concern for the environment, because it doesn't fit in their trash bin, because it is a learned behavior, etc.)?

2. Do you feel that information about how to recycle is effectively distributed throughout Hyattsville?

3. Do you think Hyattsville should create more programs to educate their citizens on recycling?

4. Do you think the pilot program has made people more aware of the importance of recycling?

5. Do you think the program has changed the recycling behaviors of Hyattsville's citizens?

6. Do you think there are differences in recycling habits among different groups of the population (by age, location, more frequently

***Script used during interviews with trash truck drivers:***

Hello, we are (your names). We wanted to talk to you today to find out your perspective on Hyattsville's Pilot Trash program and if it has had a positive impact for the city.

*Part 1 - Pilot Trash Program*

1. Why do you think Hyattsville decided to start the pilot trash program? (if more than one, ask what is most important)

2. Do you think that waste reduction is an issue of concern for Hyattsville?

3. Do you feel that the majority of Hyattsville citizens were informed of this program and its start date?

4. Do you think that the pilot trash program had an effect on trash output in Hyattsville?

5. Earlier, you stated that Hyattsville decided to start the pilot trash program to (fill in here). Do you think these goals have been accomplished by the program?

6. What do you feel were the positive results of the program? What do you think were the negative results of the program?

7. In your opinion, how could the negative results of the program be addressed?

8. How has your job been affected by the pilot trash program?

9. In your opinion, should the pilot trash program continue?

*Part 2 - Recycling*

We are also trying to study the correlation between the pilot program and its effect on recycling. We would like your opinions on the recycling behaviors of Hyattsville citizens.

1. In general, have you noticed why the majority of people recycle (concern for the environment, because it doesn't fit in their trash bin, because it is a learned behavior, etc.)?

2. Do you feel that information about how to recycle is effectively distributed throughout Hyattsville?

3. Do you think Hyattsville should create more programs to educate their citizens on recycling?

4. Have you seen any evidence that the pilot program has increased recycling?

6. Do you think there are differences in recycling habits among different groups of the population (by age, location)

## Appendix E: Focus Group Scripts

***Script used during focus group:***

1. Why do you think the City decided to start such a program?
2. Were you aware of this once-a-week program?
3. Did you ever run out of trashcans?
4. Did you notice any problems?
5. Did you notice a reduction in trash?
6. What are your thoughts on recycling?
7. Is information available to Hyattsville residents about recycling?
8. What is the most important reason for recycling for you?
9. Where do random things go?
10. Do you have any other random comments & concerns?

## Appendix F: Materials for City of Hyattsville and Prince George's County

**Figure F.1. 2009 Trash Routes**


**Figure F.1. 2010 Trash Routes**

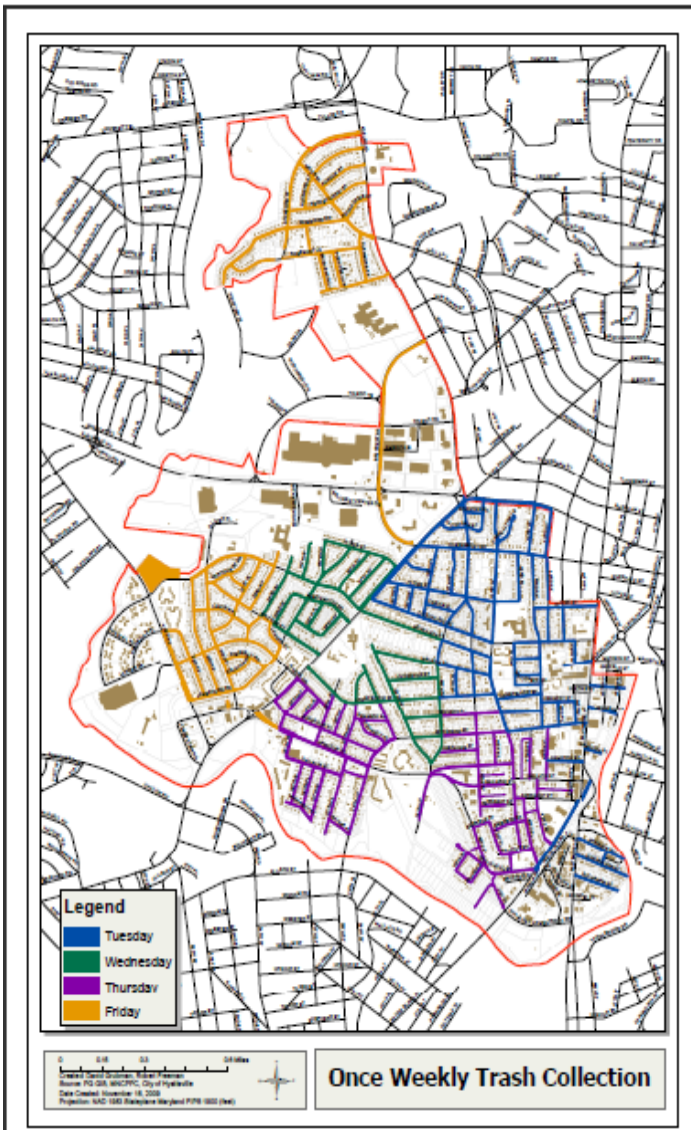


**Figure F.3. 2009 to 2010 Trash Route Change:**

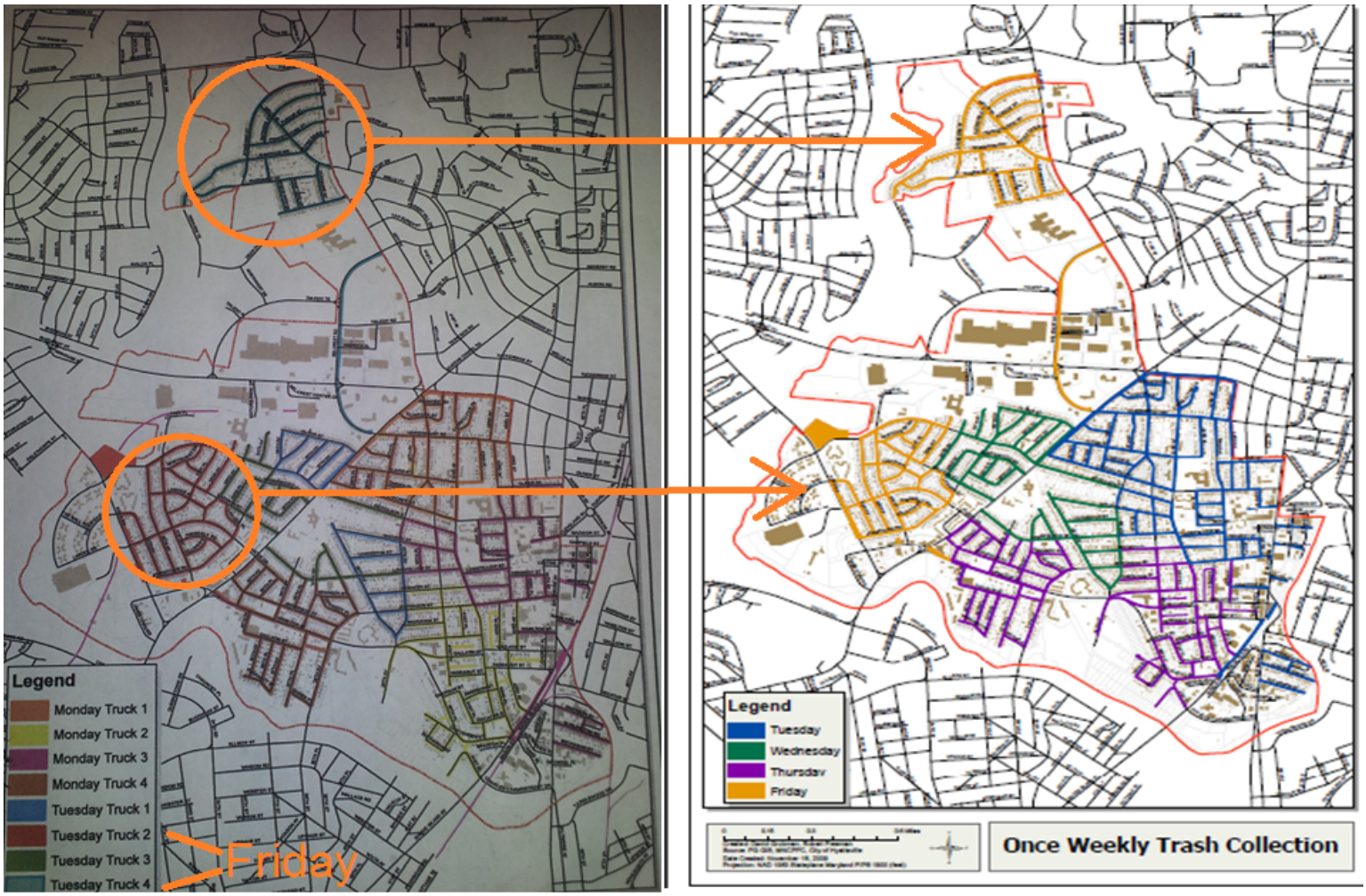
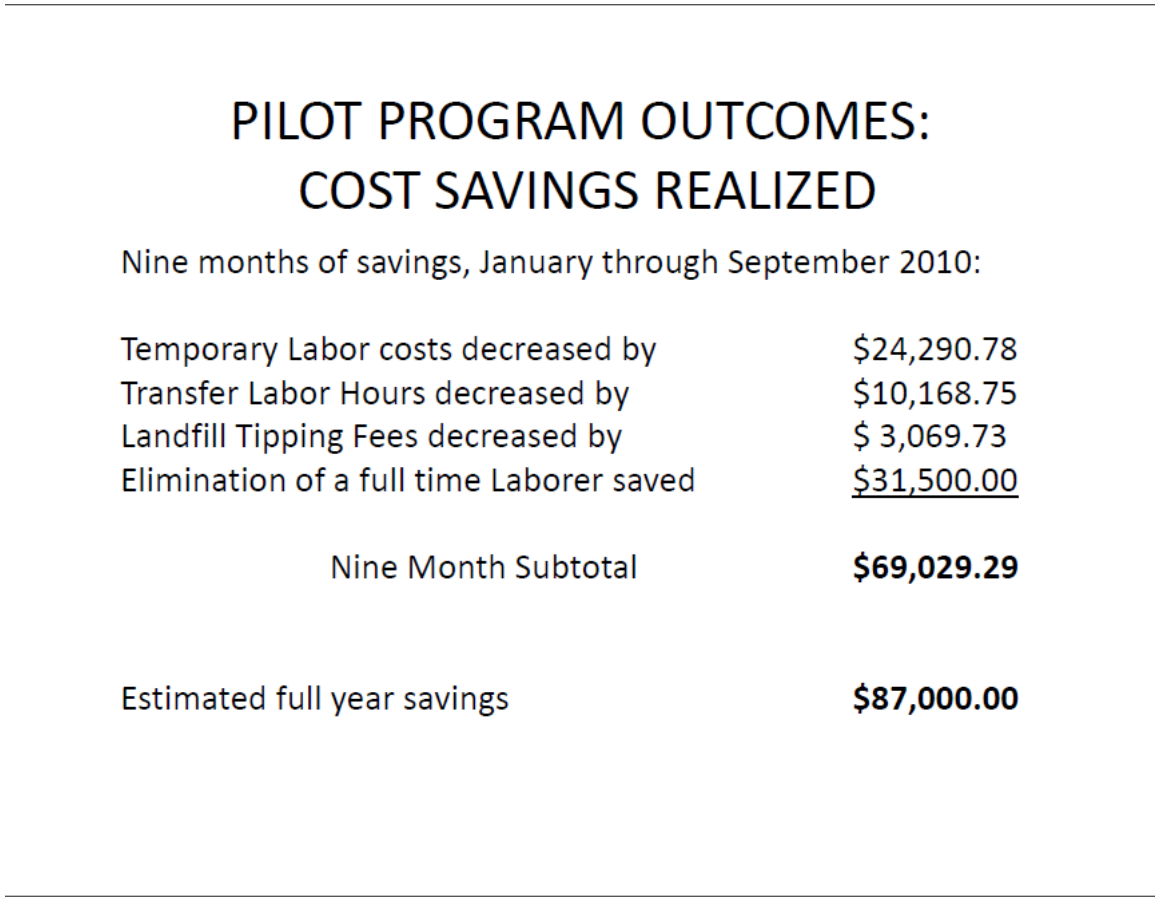


**Figure F.4. Department of Public Works - Pilot Program Savings**



PILOT PROGRAM OUTCOMES:
COST SAVINGS REALIZED

Nine months of savings, January through September 2010:

| | |
|---|---|
| Temporary Labor costs decreased by | $24,290.78 |
| Transfer Labor Hours decreased by | $10,168.75 |
| Landfill Tipping Fees decreased by | $ 3,069.73 |
| Elimination of a full time Laborer saved | $31,500.00 |
| Nine Month Subtotal | **$69,029.29** |
| Estimated full year savings | **$87,000.00** |

**Figure F.5. Property Search - Maryland Department of Assessments & Taxation**

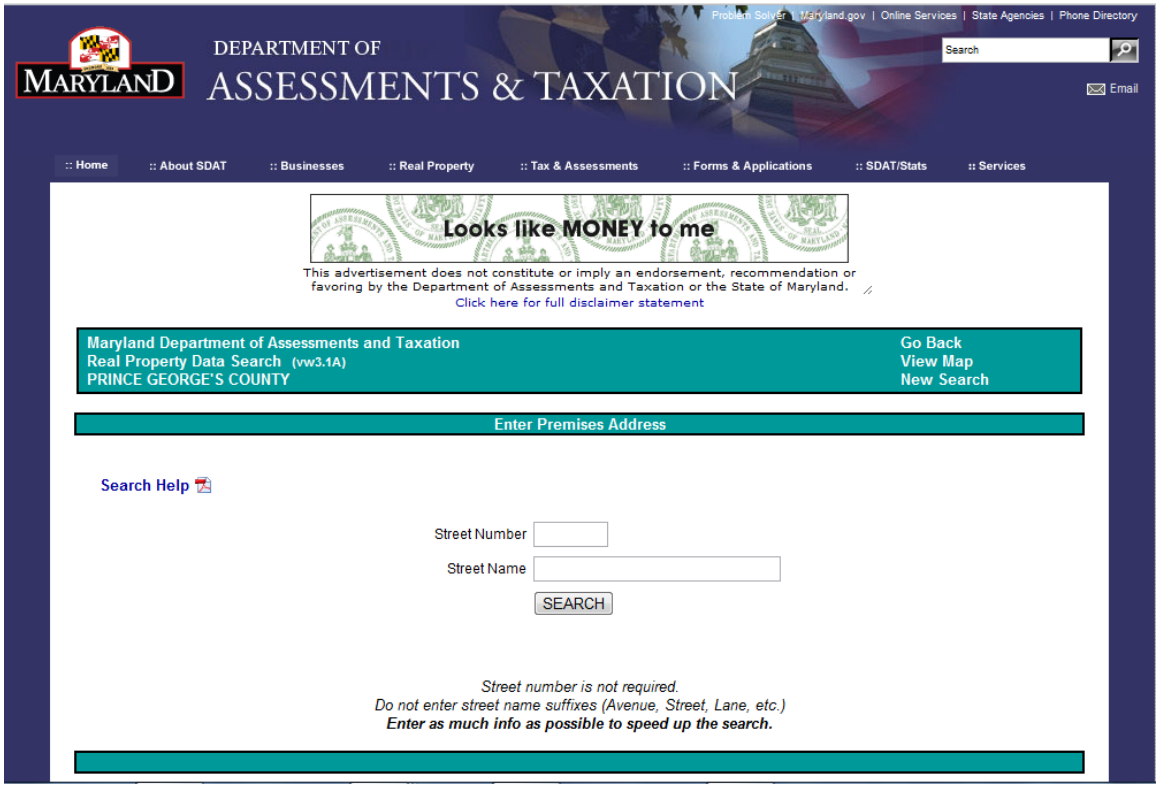


**Figure F.6. Prince George's County Recycling Flyer (English)**

**Figure F.7. Prince George's County Recycling Flyer (Spanish)**

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