APPROVAL SHEET

Title of Thesis: Baltimore City's Participation in the Zero Waste Movement: Who knows what about it and who has access to it?

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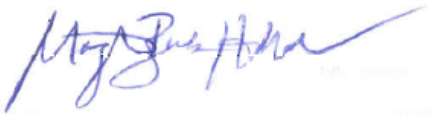
Master of Science, 2023

Thesis and Abstract Approved:



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ABSTRACT

Title of Document:	BALTIMORE CITY'S PARTICIPATION IN THE ZERO WASTE MOVEMENT: WHO KNOWS WHAT ABOUT IT AND WHO HAS ACCESS TO IT?
	Natalia M. Figueredo Botello, Master of Science, 2023
Directed By:	Dr. Margaret Holland, Geography and Environmental Systems

Through this thesis, I explore the Zero Waste Movement (ZWM) and its potential for sustainable waste management in Baltimore City. I assess how residents in Baltimore City are participating in the ZWM through surveys and interviews, highlighting accessibility issues and reliance on city services and community organizations. Additionally, I analyze the opportunities and barriers for participation in the ZWM. The findings suggest a need for improved access to and reliability of city services, increased education and outreach efforts, and equitable representation of underrepresented communities in promoting and participating in the ZWM. The study concludes that community participation, inclusion of local knowledge, and addressing systemic issues are essential for sustainable waste management and the success of the ZWM in Baltimore City.

BALTIMORE CITY'S PARTICIPATION IN THE ZERO WASTE MOVEMENT: WHO KNOWS WHAT ABOUT IT AND WHO HAS ACCESS TO IT?

By

Natalia M. Figueredo Botello

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, Baltimore County, in partial fulfillment
of the requirements for the degree of
Master of Science in
Geography & Environmental
Systems
2023

Dedication

Este tesis está dedicado a todas las personas que han inspirado y apoyado este trabajo.

Desde mis ancestros, a mis abuelitos (Rosa, Isaac, Yolanda y Waldo), a mis padres

Jorgi y Merci, mi pareja Fabian, mis hermanas Sam y Lala, y el resto de mi familia.

Todos ustedes significan el mundo para mí. Los quiero mucho.

QDMA

Acknowledgments

I would like to express my sincere gratitude to my Advisor, Maggie Holland, for her continuous guidance, encouragement, and unconditional support throughout my graduate studies. Her mentorship, friendship, insightful comments, and extensive expertise have been invaluable in shaping my research and academic career.

I am also grateful for the invaluable feedback and support provided by my committee members, Yolanda Valencia, Sarah Fouts, Tok Oyewole, and Nicole Fabricant, who provided critical feedback and constructive criticism that helped redefine my research and this thesis.

I would like to acknowledge the support provided by the ICARE program, which enabled me to pursue my research and work directly with different stakeholders, participate in conferences and workshops, and enhance my research skills.

I am thankful for the generous funding the National Science Foundation (NSF) provided through their grant, which funded my research and allowed me to collect and analyze my data.

I would also like to express my appreciation to the Lakeland STEAM Center and the South Baltimore Community Land Trust for providing valuable resources, connections, and support that facilitated my research and personal endeavors.

Finally, I would like to thank all my research participants: those who took the survey and all the interviewees. Thank you for sharing your time, knowledge, and experiences with me. This work would not have been possible without you all.

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Inspiration for Zero Waste Movement and Environmental Justice Work

Positionality Statement

Pachamama means Mother Earth in Aymara, the language of an Indigenous group in Bolivia, the language of my grandparents. I learned about *Pachamama* at an early age. A combination of my parent's passion to explore nature and the teachings of my grandmother, Rosalia, sparked a fire inside me that still burns today. I grew up very blessed in Bolivia, with access to nature every day, learning how to grow my own food, learning how to engage with the environment, and most importantly learning how to respect and love the land.

I moved to New York City when I was eight years old. This change from my beautiful Bolivia to the concrete jungle took a toll on me. I lost track of that relationship with the environment that my parents and grandparents had established because I thought I no longer had access to nature the way I did in Bolivia. Trying to fill this void, I turned to education and excelled in learning different things. I became the first one in my family to go to college in the United States, bearing the weight on my shoulders of everyone who was relying on me to succeed. I wanted to be a scientist, and the fire in me, which at the time was a small flame, pushed me to focus on the environment. I replicated everything I thought was an environmental scientist, the white lab coats, experiments under a hooded station, data collection, and analysis, but I knew something was missing. It wasn't until I participated in a program that

took me back to Bolivia, that I realized that engagement with different groups of people was what was missing. I became much more aware of the different forms of knowledge and their value outside of Westernized science.

From then on, I focused on learning about the environment from different communities. I learned about environmental justice and the fight many communities globally are in to protect themselves from the climate crisis and the overburden they experience through the pollution of their environments. I worked at a non-profit in Newark, New Jersey, and learned about the over-pollution of marginalized communities in the U.S. This trend, which is also found in Baltimore City, has placed polluting infrastructures near low-income communities of color, sacrificing their livelihood, and thereby deeming them as less than others. I learned about incineration and the many negative impacts it can have on the health of people and of the environment- from asthma in children and cancer to the loss of biodiversity. A new framework/movement- the Zero Waste Movement (ZWM)- seemed to give organizations hope for a transition away from incineration; however, when I interacted with community members, many of them either did not know about the movement or misinterpreted what it meant.

Additionally, when I initially heard about the ZWM, one of the first things I learned about was the role of composting. I realized that I had learned about composting through my grandmother back in Bolivia. She would collect all our food scraps, and although I did not understand why, she would emphasize that it was food for the land. Learning about composting through the ZWM outreach materials never included information about how this practice began. This made me think about the

local and Indigenous knowledge present in certain communities that are not taken into consideration when trying to implement “new” and innovative concepts regarding the environment.

When given the opportunity to conduct research in Baltimore City, I realized that I could use my experiences and interests to conduct research around the ZWM and local knowledge. Baltimore City has a unique history that has led to the segregation and displacement of many communities. Baltimore City also serves as part of that trend where polluting facilities are placed in new low-income, marginalized, communities of color. The City has one of the largest incinerators in the United States, which has been over polluting the communities in the Southern part of Baltimore. South Baltimore communities have been advocating against the many injustices they have faced, especially in regard to polluting facilities.

I partnered with an organization in South Baltimore that has been leading much of the social and environmental justice work in that area: The South Baltimore Community Land Trust (SBCLT). With the help of the SBCLT team, we were able to highlight a current gap in knowledge, which is understanding whether people are participating in the ZWM. Through this, I came up with three research questions:

1) Who is participating in the ZWM?
2) Who has access to the ZWM?
3) How are Baltimore City residents interpreting the ZWM?

Based on these questions, I chose two forms of methodologies. I conducted a survey that focused on understanding how Baltimore City residents are participating in the ZWM through an assessment of household waste disposal practices, perception

of reliability of waste management collection services, and knowledge of and access to the ZWM. I also conducted interviews that focused on South Baltimore Community Leaders. This was done through partnerships with the SBCLT and the Lakeland STEAM Center, which is another South Baltimore organization. I gathered information on their experience living in South Baltimore, their perception of garbage in their community, and knowledge of the ZWM. Additionally, through a community-engaged approach and partnership with the Lakeland STEAM Center, I was able to facilitate a variety of community events in the Lakeland Community, that began conversations of transitioning into ZWM initiatives, and emphasized the importance of community participation.

Through this research, I demonstrate the flaws of the current waste management systems in Baltimore and highlight how Baltimore City residents are transitioning away from incineration. The next Chapter of this thesis focuses on setting a foundation for my research, where I bring into conversation different authors that highlight the current waste management systems and their flaws, the ZWM and ZW-related alternative solutions to waste management systems, and the importance of local knowledge and community participation. The following chapter, Chapter Two, focused on the research I conducted in Baltimore City methodology to results. The findings from this research can be used to inform policies and programs that better serve the needs and concerns of Baltimore City residents, particularly those in marginalized communities of color.

Chapter 1: Municipal Solid Waste Management, the Zero Waste Movement, and the Importance of Community Participation and Local Knowledge

Introduction

Solid waste production and disposal have become an issue of urgency worldwide due to the rapid growth in population, mass consumption, and urbanization (Eriksson and Bisaillon, 2011). Municipal solid waste (MSW), which refers to a mixture of materials discarded by rural and urban populations, continues to increase in volume and poses a serious threat to the environment and people if not treated properly (Nanda & Berruti 2021). Globally, close to 2.01 billion tons of MSW are produced annually, from which at least one-third[1] are not collected or managed by municipalities (Waste Atlas, 2018). Most of MSW that is collected is not managed correctly because the life cycle of useful materials that could otherwise be composted, resold, reused, repurposed, or recycled, is ended early (Zaman 2015). Seventy percent of collected MSW ends up in landfills, 19% is recycled, and 11% is incinerated (Nando & Berruti 2021). These high levels of MSW being sent to landfills and incinerators are too often normalized despite growing concerns for what it means for both public health and the environment.

[1] This one-third of waste is considered "unmanaged" or "mismanaged" waste, which results in the contamination of oceans (Ijjasz-vasquez et al., 2018). This is becoming a concerning issue, especially in low-income countries. About 90% of marine debris is plastic and it is a direct result of dumping waste in bodies of water (Ijjasz-vasquez et al., 2018).

Historically, MSW management was shaped to serve a linear economy through which the production cycle goes from extraction, to manufacture, to sales, to consumption, and disposal (Pietzsch et al. 2017), leaving no room for waste prevention. This linear economy model continues today and has created a "take, make, dispose" pattern (Zhang et al. 2022) that leads to the depletion of natural resources and has generated a glut of problems for those making decisions about solid waste management. Under the linear economy model, current MSWM management systems follow a "solid waste hierarchy" framework that prioritizes waste prevention at a surface level, meaning there is minimal effort on preventing the production of waste (Pietzsch et al. 2017). This framework heavily relies on the more harmful solutions to waste- such as incineration and landfilling (Pietzsch et al. 2017). Both systems process waste prematurely, resulting in much more waste than should be generated. Waste that is not stored or processed correctly has many negative impacts- both on the environment and on public health. Both systems for storage and processing generate some level of greenhouse gas (GHG) emissions that contribute to the climate crisis and release pollutants that contaminate water, air, and soil which can trigger health impacts for living organisms who are exposed to them (Pietzsch et al. 2017). Most often, MSW management systems for storage and processing are sited near marginalized or overburdened and underserved communities, ultimately impacting those who have already suffered from prior environmental degradation and who have the fewest resources or least access to assistance for mitigating damages (Martuzzi et al., 2010). Additionally, when compared to more sustainable systems

such as repurposing, reusing, recycling[2], and composting programs, these systems are not economically beneficial in the long run (Zaman, 2015). Taking all of this into consideration, incineration and landfilling are evidently not beneficial or sustainable-making them flawed. There is an urgent need for the incorporation of more sustainable and efficient MSW management systems that consider and prioritize climate change impacts, the environment, and people's health.

If we are to confront the inefficiencies and unsustainable challenges presented by our current and prevailing approach to MSWM, we will also need to shift our overall approach to one that is multifaceted, embracing interdisciplinary and cross-sectoral thinking, inclusive of different groups of people, and that prioritizes environmental, economic, and social factors in decision-making. This is the thinking behind a newer framework known as "Zero Waste" (Zaman and Swapan, 2016). A defining characteristic of the Zero Waste (ZW) framework is that it embraces a circular economy model, which focuses on integrating producer and consumer interests and priorities for sustainability at all stages of production and consumption, with the goal of producing less waste and viewing waste not as disposable, but rather as a resource that can be re-envisioned, re-purposed, and re-inserted into the circular flow of the economy (Ghisellini et al., 2016; Pietzsch et al., 2017). The ZW framework takes the position that technology cannot be the only way to solve waste problems sustainably, rather it requires community participation, service infrastructure, regulatory policy, and environmentally friendly technology (Zaman

[2] If done properly, recycling can be part of the sustainable waste management systems. However, there are many reports that highlight that much of what is being recycled end up in landfills. This is because the current systems emplaced both technologically and politically are flawed.

2017). This framework, which is also known as a movement, first appeared in the 1970s in Australia and has since then become popular in the US and other parts of the world (Connet 2013).

MSW management systems are used by and are essential to, everyone but tend to be implemented by and only beneficial to governments and businesses. There is a need for better waste management systems that include ZW-related principles and initiatives. A central characteristic of the ZW framework is the interdisciplinary approach that brings in different stakeholders, particularly those who participate in and/or are affected by the current waste management systems. Multiple studies have demonstrated that there are many ways in which community involvement is necessary and can even enhance the sustainability and efficiency of waste management systems (Sekito et al., 2013; Siragusa and Arzyutov, 2020; Mohammed et al., 2021; Thyberg and Tonjes, 2015), particularly when the design and management of MSW include strategies to encourage behavior change, consideration of cultural traditions, emphasizes local employment and mobilizes for increasing acceptance, interest, and motivation among local community members (Thyberg and Tonjes, 2015).

In this review, I look more deeply into the current practices and the debates over solid waste management systems specifically tied to the North American context. Specifically, I characterize the main flaws inherent in the current approach to MSW management systems and highlight existing research and evidence on what efficient and sustainable waste management systems look like, including studies that

demonstrate the important role that community participation and local Indigenous knowledge play when proposing new solutions to the waste crisis. This review establishes the foundation and motivation for my research on MSW management reform, the Zero Waste Movement (ZWM), and the role of community participation and local knowledge in SWM in Baltimore City. During the summer of 2022, I worked closely with South Baltimore communities that have been disproportionately affected by pollution that is emitted from the surrounding industrial facilities, including an MSW incinerator. I focused on 1) understanding who is participating in the ZWM, 2) who has access to the ZWM, and 3) how local knowledge is sought, interpreted, and used within the ZWM.

I organized this review chapter into five sections. In the next section, I present a step-by-step methodology implemented to develop this literature review. Section three goes over literature that focuses on waste management systems and is divided into two subsections: (a) current waste systems and (b) alternative solutions under the Zero Waste framework. The first subsection discusses different authors that demonstrate what the current waste management systems are and how they are inefficient. The second subsection focuses on alternative efficient waste management systems and some of the success factors and challenges. The fourth section discusses community involvement and participation in relation to waste management. This section is also divided into two subsections. The first subsection focuses on ongoing community participation and how this is important when presenting alternative methods for waste management. The second subsection focuses on community

involvement through local and Indigenous knowledge and how this can be beneficial for sustainable waste management systems. The fifth section is my conclusion where I summarize my findings based on the literature review and discuss the next steps for my research.

Methodology

I followed a systematic analysis method using an approach similar to Pietzsch et al., (2017). The development of this review was done through 3 steps: 1) research objective, 2) database selection, and 3) keyword identification.

Regarding step one, the research objective of this study, I identify flaws and challenges confronting our current prevailing approach to municipal waste management, the importance of a rapid transition to more efficient systems, and the value of including local knowledge when designing more efficient and sustainable systems. Regarding the second step, database selection, I searched published studies within Google Scholar and the Web of Science databases. Choosing both databases was beneficial because I encountered a range of journals that focused on waste management and social issues that cross disciplinary boundaries, such as Waste Management, Journal of Planning Education and Research, Geoforum, and Recycling. For the third step, key identification, I developed and refined a series of search strings using Boolean terms to yield results from within both databases. My search strings were as follows:

I. “Waste Management” OR “Solid Waste Management” AND “Challenges”

II. “Solid Waste Management” AND “Zero Waste”

III. "Waste management" AND ["intergenerational knowledge" OR "local knowledge" OR "community participation"]

IV. "Local knowledge" AND "waste management"“

V. Indigenous Knowledge AND solid waste management”

VI. [“Solid waste management” OR “waste systems” OR “waste reduction”] AND [“community”] AND [“participation” OR “involvement” OR “input”]

I found additional literature through the suggestion of some articles by my advisor and thesis committee, through conversations with other students, and through backwards and forwards reference diving tied to articles I had already reviewed.

Waste Management: Current and Alternative Waste Management Systems

This section will discuss the two sides of waste management: the current MSW management systems and the beneficial alternatives under a ZW framework. I will first analyze the flaws that are associated with the current waste systems typically found in North American cities. In the second section, I will focus on more sustainable solutions, using the Zero-Waste framework, and will go over why these options are beneficial.

Current prevailing strategies for MSW management systems

As waste production continues to increase, it is important to understand how our current waste systems are managed, whether they are sustainable, and how they affect the public and the environment. While this literature review focuses on MSW systems used in the US, there are more examples on a global scale that can help add information to our knowledge of current waste management systems. Globally, landfilling and incineration are the most common MSW management systems, both of which are heavily used within the United States. While these two forms of waste management have been heavily relied upon to manage the waste generated by our production, consumption, and disposal patterns, there are many critiques against them. The main issues with both are tied to a range of negative impacts on public health and environmental degradation of air, soil, and waterways. The climate crisis adds to the urgency and concern tied to these impacts since these systems further exacerbate the effects we are already experiencing from warming temperatures and more frequent and intense weather events. Regarding public health, both incineration and landfill release pollutants that directly harm the health of communities that live nearby. Both waste technologies rely on the "end-of-life" concept, where waste is seen as only disposable, and although both are seen as economically beneficial options, if environmental pollution, resource depletion, and medical care are taken into consideration, both become more expensive (Zaman and Swapan 2016). This is to say that there are more downsides than benefits to these waste management systems.

Incineration as a waste management system is popular because it is a technology that provides a faster and more productive way of reducing solid waste in comparison to landfills. This waste management system provides a "waste to energy" model that generates electricity from burning waste (Allegrini et al., 2015). Additionally, it reduces the mass and volume of MSW by 70% and 90%, respectively (Luo et al., 2019), meaning there is less need for space to store MSW. While these aspects sound appealing, there have many negative critiques against this system specifically because of the environmental and public health effects that outweigh the generation of electricity and reduction of the size of garbage.

Environmental and Public Health Impacts

Waste management systems account for about 5% of GHG emissions in the world (Kristanto & Koven 2019), which is very low when compared to other sectors like the energy and industrial sector, which contribute more than 65% of GHG (Bogner et al., 2007). This has led to less policy attention at all levels to focus on more efficient and sustainable waste management as a climate change mitigation and adaptation solution. However, other studies demonstrate that waste systems are a significant contributor to GHG emissions (GAIA 2022). According to a recent report, the waste sector is the third biggest contributor to methane, which is a powerful GHG that traps about 83 times more heat than carbon dioxide (GAIA 2022). This GHG heavily exacerbates the climate change crisis, as it is responsible for 0.5C of today's increase in temperature (GAIA 2022). In efforts to mitigate and adapt to climate change impacts caused by GHG emissions, it is important to understand the

environmental impacts caused by systems like incinerators. There are many opinions regarding incineration and the release of GHG and other toxic pollutants. Several studies have assessed the environmental impacts of incinerators and have found that there is a decrease in GHG released by incinerators when compared to landfills (Yao et al., 2019, Gu et al., 2019). However, these studies rely on the worst-case comparison to show that incinerators could be beneficial. The reality is that what is being released by incinerators continues to impact the environment and public health (GAIA 2022). A study by Hu et al. (2015) investigated the environmental impacts of five MSW incinerators in Wuhan, China, and found that all incinerators were releasing more GHG and toxic pollutants than what was allowed by the standards of the Ministry of Environmental Protection. This is because all five incinerators lacked environmental impact assessments (EIA), which are protocols followed by the government to ensure that incineration plants are not over-polluting. The absence of monitoring or oversight resulted in higher GHG emissions and other pollutants that are not accounted for in any official process of documenting emissions and led to severe environmental impacts (Hu et al., 2015). The EIA system has not been properly enforced and all five incinerators are violating regulations and laws, which can be considered a crime, given their release of hazardous pollutants.

Another study compared technologies used in waste systems management and assessed the environmental impacts of each system. The study concluded that incineration was the least preferred system in comparison to composting and anaerobic digestion systems (Mayer et al. 2020). Both composting and anaerobic

digestion systems are looked at as alternatives to incineration and landfilling. The study demonstrated that incineration results in more pollution and GHG and concluded that incineration and landfilling should be considered as the last option to waste management when taking into consideration more sustainable and efficient options (Mayer et al. 2020). Furthermore, another study conducted by Cudjoe and Acquah (2020) assessed the environmental impacts caused by incinerators across fifty-six countries in Africa. The study focused on the emission of acid gasses and dioxins and concluded incinerators led to higher emissions of both. The study also concluded that as incineration projects continue to increase, so will the pollution that is emitted and suggested more supervision from policymakers and the public. Another suggestion from the study is pushing more waste reduction and recycling initiatives to minimize the number of planned incinerator projects in the region. Additionally, the study recommended situating the incineration plants in strategic locations that are not near communities to avoid or minimize harmful effects on public health (Cudjoe and Acquah, 2020).

Other studies have focused on the byproduct - or waste residuals - of the incineration process and assessed its effects on local environments and public health. Byproducts or residual waste from the process include bottom ash, fly ash, and additional air pollutants (Phua et al., 2019), which are sent to landfills. These byproducts can contain large amounts of heavy metals and carcinogenic material that when sent to a landfill can leach, spread around, and can present a high risk of negative effects when those materials mix with local soil and water, as well as

increased risk to public health when the incinerator and landfill systems are sited in close proximity to where people live (Hu et al., 2015; Li et al. 2019; Yin et al., 2019).

Pollutants after incineration can disperse the air, water, and soil, meaning that people can be exposed directly through inhalation and consumption of food or water. The literature on the impacts of incinerators on public health is limited but there are many examples worldwide that can demonstrate the impacts the incinerators can cause in the US. A study done in Italy assessed the rates of miscarriages of women between the ages of 15-49 that lived near 7 incinerators (Candela et al., 2015). The results demonstrated that the increase in emissions of PM10, which are particles found in smoke and dust, was associated with an increased risk of miscarriages (Candela et al., 2015). Research conducted in France analyzed the births of women living within a 4km radius of an incinerator at the time of delivery and demonstrated that increased exposure to the incinerator increased pre-term delivery (Candela et al., 2013). Another study demonstrated an association between the risk of urinary tract birth defects and proximity to MSW incinerator emissions (Cordier et al., 2010). These studies and many more help showcase the impacts pollution emissions from incinerators can have on the public health of people living near them.

Social Impacts

Another concern with current systems of waste management is one of social and environmental injustice. There is a clear tendency to place incinerators and

landfills near some of the most vulnerable communities. These communities are often minoritized, racialized, and marginalized groups who are left to face the consequences caused by these systems. A 2019 report by the Global Alliance for Incinerator Alternatives (GAIA) highlighted the connections between waste incineration and environmental justice (EJ) communities within the United States. Within the context of this report, EJ communities are defined as low-income communities of color that face the negative effects of pollution caused by an excess of polluting factories that surround them. The report demonstrates that 80 percent of all MSW incinerators in the U.S. are located in EJ communities. This statistic is not a coincidence, but rather the result of a purposefully thought-out process that is historically backed up by racial segregation and zoning laws (GAIA 2019). Historically, heavy industry in certain urban zones resulted in lower land values, which were affordable to people of color who were pushed to reside in those areas. This cycle continues today and is exacerbated by the added layers of negative human health and environmental impacts produced by incinerators. The GAIA report identifies several key concerns tied to waste incineration, which are: immediate health impacts from pollution, high numbers of cases of childhood asthma and cardiac disease, the stigma of being a "dumping ground" to waste produced by often white wealthier communities, depressed land values, and a continued trend of a decrease in recycling, composting, and waste reduction efforts to preserve incentives to burn more waste and increase in sources of pollution (GAIA, 2019).

Other studies from around the world show similar results: incinerators being placed around minoritized/ marginalized communities. A study conducted in France focused on the correlation between the location of incinerators and the population of immigrants (Laurian & Funderburg 2014). The study demonstrated that the higher a town's population that included "foreign-born" increased the odds that the town received an incinerator by 29%. This means that with more immigrants in a town, the more probability that an incinerator will be placed in that location. Another study analyzed social class and proximity to an incinerator in Italy and the UK and found that there was a direct relationship between social class and proximity to incinerators (Martuzzi et al., 2010). There is a pattern dictated by race and class that places these harmful waste management systems near those who are of a different race and lower class. Policymakers have the power to change these dynamics through waste management planning and zoning laws, yet these trends continue today.

Furthermore, beyond the issues with the technologies themselves, waste management is also a political issue. In some places, incinerators have been classified as renewable energy but burning garbage to produce energy is far from renewables. Currently, 23 states in the US legally consider incinerators renewable energy (ILSR 2018). This has allowed the incineration industry to receive subsidies that take away funding from actual renewable energy like wind and solar projects. Maryland is an example of a state that allows incineration to be considered renewable energy. The Wheelabrator Incinerator, which over-pollutes South Baltimore communities, earned about $10 million in subsidies between 2011 and 2017 (ILSR 2018). Policy plays an important role in maintaining the incineration industry relevant.

Waste management is one service that governments worldwide have in common and must provide. Globally, the production of waste is heightened through consumption and production patterns under capitalism. Policymakers are left with the decision of choosing economically beneficial solutions or ones that are sustainable and ethical. Most often, decision-makers have chosen the less costly option, with the tradeoff of being willing to sacrifice both the environment and people's health.

Alternative Solutions under the ZW Framework

Effective and sustainable waste management systems require a holistic approach that includes important stakeholders such as community organizations and community members, policymakers, and business owners. An emerging initiative, also referred to as a framework for waste management known as Zero Waste has proposed beneficial solutions to the flaws within the current waste management systems. The term "Zero Waste" was coined in 1973 by Dr. Paul Palmer and it was used for recovering materials from chemical products (Palmer 2004). It has since then transitioned into a concept that emphasizes the reduction of waste through composting, recycling, reusing, and repurposing. Zero Waste operates under a circular economy, through which waste is considered a resource (Zaman, 2015). A circular economy proposes to maintain a cyclical flow of resources after extraction and production (Ghisellini et al. 2016), meaning a circulation of waste material. When waste is viewed as a resource, rather than something that doesn't have a use anymore, it can be regenerated and used in multiple different forms through

recycling, reusing, composting, and repurposing. In a circular economy, Zero Waste represents a shift from the traditional linear economy model to integrated systems through which everything has a use (Song et al., 2015).

Through this circular economy, it is important to define ZW. The Zero Waste International Alliance has defined ZW as "the management of products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury waste" (2018). In this definition, the main goal of ZW is to reduce the production and disposal of waste. The ZW framework shifts away from incineration and landfills and proposes practices such as resource conservation, recycling, and composting as solutions to the waste crisis. For Cole et al. (2014), the definition of ZW embodies waste prevention, high recycling rates, and valuation of all resources originating from waste without the need for landfills or incinerators. Other definitions include waste reduction through policy change and education. The key aspects of the ZW framework are the management of waste holistically, the development of policies that address smart production and services of waste, the communication with and education to citizens, planning the production of products with extended lifetime, and investing in technologies for adequate management (Pietzsch et al. 2017). There needs to be a complete change from the current waste management systems that include all these aspects to protect the environment and public health. Researchers that have focused on the ZW framework have emphasized that for this model to be successful there needs to be a shift from the existing extraction, production, marketing, consumption,

management, and treatment systems (Zaman 2015). There are several examples globally of projects that have initiated this transition into the ZW framework.

Many studies have examined the benefits and challenges associated with implementing a ZW framework on a local scale. A study was conducted in Great Manchester (UK) to understand the transition towards more sustainable waste management systems (Uyarra & Gee 2013). The authors demonstrate that the city rejected the traditional polluting systems and underwent an environmentally sustainable transformation that went from a landfill model to more complex waste solutions under the ZW framework, including recycling, composting, and sustainable energy use. The transition from a simple landfill into more complex systems was successful due to the mix of political vision, scale economies, stakeholder engagement, market-shaping, and the ability of waste disposal managers to gather expertise and resources, and political influence at multiple levels. This study serves as an example of a community that has been successful in transitioning into more sustainable waste management systems. It shows that is possible to do it, and it emphasizes the importance and need for an interdisciplinary approach to the transition into more sustainable options.

There are many benefits to transitioning into the ZW framework. Studies have shown that there are economic benefits to this transition and thereby should be favored more by policymakers and businesses (Zaman & Swapan 2016, Zaman 2015, Cole et al., 2014). Substituting the demand for virgin materials, meaning materials

that have been newly produced, through ZW initiatives, people could save money on energy and processed water (Zaman 2015). Pietzsch et al. (2017) also demonstrate economic benefits as well as community benefits, environmental benefits, and benefits for the industries and their stakeholders. Regarding economic benefits, Pietzsch et al. mention cost reduction regarding waste collection and disposal systems in municipalities, meaning benefits to the government. Also, there can be economic benefits through the creation of green jobs, which would increase income flow. Community benefits include less exposure to polluting systems, meaning a reduction of risk to public health. Also, with the implementation of more sustainable systems such as composting, recycling, and reusing factories, there is an increase in jobs and thereby wealth. Regarding environmental benefits, Pietzsch et al. (2017) mention some advantages: reduction of negative impacts caused by waste generation, reduction of greenhouse gas emissions, reduction of energy consumption, reduction of the use of toxic materials in products, and increased environmental protection. Lastly, regarding benefits to industries and their stakeholders, the study demonstrates that there can be improved efficiency and productivity by producing more with less, improvement of products through an extended life cycle, and industrial symbiosis practices which means that companies can pass their waste to other companies that can use it. These studies demonstrate that there are many incentives to transition into the ZW framework. This transition can be beneficial for the government, private companies and businesses, and local communities.

Some challenges arise when implementing the ZW framework. Currently, some factors prevent policymakers, businesses, and people from transitioning into the ZW framework. Economic growth, measurement mechanisms, consumer demand, and other conflicts of interest can inhibit ZW implementation (Bufoni et al. 2016). Another study mentions that there are challenges at political, cultural, technological, and economic levels (Pietsch et al. 2017). At the political level, there is a need for mandatory waste management policies and strong commitment and support from policymakers, which is hard to find. At a cultural level, it is hard to suddenly change consumption behaviors and patterns. At a technological level, there are many constraints such as regions, country development, and markets of individual countries. At an economic level, there is a need to extensively plan agreements that regulate taxation and discounts regarding the taxes to monitor and control the impact of waste after its generation. There currently is no planning in this regard. Also, there won't be a shift to more repurposing, recycling, and composting initiatives unless it's financially advantageous, and many policymakers and businesses do not see a financial advantage.

Pietzsch et al. (2017) also discuss success factors for ZW, meaning essential aspects that need to be adopted for the ZW framework to work. Among these success factors is a holistic approach that builds on public-private partnerships, regulation rates, and incentives to divert waste from landfills and incinerators, the commitment of politicians and public administrators for the implementation of ZW, product redesigning prioritizing renewable raw material, and consumer behavioral change.

These factors are the opposite of the challenges and thereby need to be taken into consideration when proposing a shift into the ZW framework. There is also a need for the inclusion of different groups of people that are considered important, not just policymakers and businesses- among these is the participation of the local communities and voices of those who are not typically included.

Community Knowledge and Participation

In this section, I will focus on community input, involvement, and participation within waste management systems. I will first discuss the influence of local Indigenous knowledge and its benefits within waste management. I will then focus on community participation and its importance within the proposal of waste management practices and policies.

Local/Indigenous in Waste Management

Before the introduction of technology, industrialization, and scientific knowledge, people acted on instincts and knowledge that was passed down from one generation to the next. This knowledge was influenced by culture, traditions, location, and experience (Ajibade, 2007). This form of knowledge can differ from place to place, but it is still present today. I am referring to local and Indigenous knowledge, which can be defined as knowledge gained through experience, traditional knowledge, ethnoscience, and folk knowledge (Adedipe & Okuneye, 2004, Corburn 2003). This form of knowledge is often not studied in more formal Western education settings or forms of practice. Only recently have researchers focused on ways of

preserving and integrating traditional knowledge, and attributed value to this form of knowledge in sustainable development conversations. However, most of the time, local/Indigenous knowledge is not acknowledged as a concept that can contribute to solid waste management practices. There are a few studies that demonstrate the potential impact this form of knowledge can have on these waste management systems and governance (Corbun 2003, Hari 2020, Maddox et al., 2011). This form of knowledge needs to be acknowledged, recognized, and included in conversations and policies regarding waste management.

One of the main aspects of local/Indigenous knowledge is respect for the land, which stems from a unique relationship with the environment that prioritizes its well-being. With this type of respect, waste is not just seen as disposable, but it is seen as a resource, just like in the ZW framework. Composting, reuse, recycling, and recovery of waste are prioritized within households that use local/Indigenous knowledge. This form of local knowledge usage is very similar in comparison to the ZW framework, just practiced at a smaller scale. This is how this form of knowledge can be introduced into waste management systems. A study done by Kosoe et al. (2019) explored the relevance of traditional and Indigenous knowledge in waste management in urban areas of Ghana. The results of this study demonstrated that Indigenous knowledge played a significant role in waste management. There were Indigenous practices, such as taboos that prohibited people from farming on Sundays, which resulted in community-initiated projects that included community cleanups, building communal toilets, and construction of toilets. Other forms of knowledge included

household composting, food waste to feed the livestock, and waste conversion through reuse and recycling. There is much value to local/Indigenous knowledge through reuse and recycling practices however, Kosoe et al. do emphasize that these practices can be difficult to implement large scale due to the modernization of lifestyles and adoption of new technologies by policymakers, and thereby recommends for Indigenous knowledge to be included in environmental education and policies to bring awareness.

Another similar study was conducted by Ajibabde (2007) in Nigeria. This study focused on Indigenous knowledge systems in relation to waste management. Ajibade found that Indigenous practices such as composting, recycling food and yard waste to feed animals, and recycling and reusing other wastes were common in rural areas of Nigeria. This knowledge is very important and beneficial; however, it did not have a significant impact on waste management. This is because the scale of waste that is being produced is a lot higher than the frequency of these practices being used. Also, the reuse and recycling practices have not developed into new waste material like the Kosoe et al. study. Ajibade does emphasize the importance of Indigenous knowledge systems in relation to waste management but suggests that there be more inclusion of it in education and to create greater awareness of the waste crisis through education.

Another similar study by Siragusa and Arzyutov (2020) focused on sustainable practices of reuse among Indigenous groups in the Russian North. The

authors focused on practices that different Indigenous groups have been passing down from one generation to the next. All the Indigenous groups demonstrated the use of local knowledge and emplaced practices such as using car tires to decorate gardens, using oil barrels to collect rain, using plastic bottles as vases, and even reusing textiles to make dolls for children. This knowledge is established on care and respect for the environment and these Indigenous groups maintain a mindset of "nothing goes to waste". The authors recommend paying more attention to non-hegemonic waste practices, which are often excluded in waste management literature. This form of knowledge needs to be fully acknowledged for the social and cultural values it provides.

All these studies emphasize the need for the integration of education and local/Indigenous knowledge to promote more efficient and sustainable waste management practices. There is a need to pass down this form of knowledge and can be done through the educational system. A study done by Maddox et al. (2011) researched the impact of intergenerational influence and knowledge in relation to school-based waste reduction. The researchers analyzed 6705 primary-age children in 39 schools in England and taught concepts of reusing, recycling, and reducing waste to take back to their families at home. As seen by the two previously mentioned studies, these concepts are embedded within local/Indigenous knowledge waste management practices. Maddox et al. found that household waste behavior can be positively impacted by intergenerational influence and knowledge via school-based waste education programs. The researchers concluded that these types of educational

programs can play a crucial role in the development of children's knowledge regarding sustainable waste management practices. The study demonstrates the importance of incorporating this form of knowledge within school systems so that it can be taken home and efficiently practiced by the whole household. Children who learn this knowledge can have an immediate impact on their household's waste behavior.

In sum, including local/Indigenous knowledge in education programs can be very beneficial. Incorporating this knowledge can change waste behaviors into more sustainable ones that include reusing, reducing, recycling, and even composting waste. These practices align with the ZW framework, and thereby local and Indigenous knowledge should be included and acknowledged within the process of transitioning into the ZW framework that includes more sustainable waste management practices.

Community Participation in Waste Management

Other important factors of sustainable waste management systems is community engagement and participation. As highlighted by the studies mentioned in the waste management section, there is a need for an intersectional approach that involves important stakeholders, politicians, and businesses for waste management systems to be efficient and sustainable. Even when talking about the ZW framework, the majority of studies discuss the need for a "holistic approach" (Pietzsch 2017).

This approach involves important stakeholders, which can be defined as the people who produce and are affected by waste. These would be the communities that use and/or are surrounded by the current waste management systems. Community participation is essential for waste management systems to be successful in an efficient and sustainable manner.

Some studies have investigated the impact of community participation and involvement on the success of the efficiency of waste management systems. A study was conducted in Indonesia to understand the impact of community participation in implementing effective solid waste management policies (Brotosusilo et al., 2020). The results demonstrated that community participation is very important when proposing sustainable waste management policies. The authors found that participation in waste disposal increased with the frequency of involvement in community social activities, education levels, and empowerment. The study demonstrates that when there is a sense of community (due to social gatherings), there is more involvement of the community in sustainable waste management. Additionally, when communities are empowered, there is more environmental awareness, which leads to more environmentally friendly waste management options. The study suggested that the transition to sustainable waste management practices requires the inclusion of the community. This inclusion must involve social community activities such as community clean-ups and other social gatherings at a grassroots level, community empowerment, and education. Community organizations are a key element in integrating sustainable waste management systems because these

organizations have proven to build trust and bring communities together (Wright & Reames 2020). Community organizations provide a model that unites and empowers community members.

Another study that focused on community involvement was done by Sekito et al. (2013). This study also emphasized the need for a change in the current waste management systems into alternative solutions that involves community. They proposed a "Community Based Waste Management System", which is centered around community-led practices such as composting, recycling, and reusing. Again, these are practices that are included within the ZW framework. The results of this study demonstrated that this community-based model has a positive impact on waste behaviors. The community they focused on changed behaviors of dumping waste on roads or rivers and burning waste. Using a system like the one Sekito et al. (2013) suggest with the ZW framework can be very beneficial, as it would provide more efficient waste management at a local level. Involving the community in a way that brings residents together and places them in places of empowerment and responsibility, is necessary, can have a positive impact on waste management, and is essential for the ZW framework to be successful.

There is a need for more studies that focus on the benefits of community involvement in waste management and in policies in general. The studies mentioned in this section all suggested that education be part of community empowerment, especially education relating to waste. I believe this is where local/Indigenous

knowledge can also be introduced. Many communities do not acknowledge that some of their own practices are already sustainable and are forms of local knowledge. Including this form of knowledge in an educational model for communities can lead to a positive cycle of learning and empowerment, which would result in community participation in sustainable waste practices.

Conclusion

Solid waste management systems under the linear economy are quickly becoming a problem worldwide. The current waste management systems are inefficient to deal with our ever-increasing amounts of waste due to environmental and public health issues that arise from them. There is a need for more sustainable and ethical waste management systems that take an interdisciplinary approach bringing together politicians, businesses, and communities affected. The ZW framework encompasses this interdisciplinary approach and has been demonstrated to be an efficient alternative solution to current waste management. Additionally, it is very important to understand the impact community participation and involvement can have on waste management systems, given that implementation of new solutions can start at a local level and then expand.

In this literature review, I aim to understand the current waste management systems such as incineration and bring into conversation the ZW framework that proposes new more efficient, and sustainable systems, ultimately allowing a transition away from waste incineration and negative practices associated with landfilling. I also

highlight the importance of local/Indigenous knowledge and community involvement in waste management systems. Through my review, I characterize how and why current waste systems are flawed. Because there is no interdisciplinary approach, the faith in these systems is left in the hands of decision-makers and businesses, and the public is often left out of the conversation. Current waste management systems have worsened the climate crisis due to the emission of pollution and are negatively impacting public health. Importantly these GHG emissions (especially methane) and harmful air pollutants go unaccounted for. The studies included in this review mentioned a need for a transition into more sustainable and efficient solutions.

The ZW framework seems like the most prominent solution as it prioritizes composting, reusing, and recycling through an interdisciplinary approach. The studies reviewed in this paper demonstrate that there are many benefits and incentives for implementing the alternative solutions included in the ZW framework. However, until now some challenges limit the implementation of this framework. I believe the limitation of this framework can be resolved through a small-scale approach. Therefore, local knowledge and community involvement are very important in waste management. This review demonstrates that local/Indigenous knowledge can serve as an essential factor for sustainable waste management practices. This form of knowledge needs to be included in educational platforms and acknowledged within the ZW framework.

This literature review serves as the foundation for my thesis research, which focuses on understanding how Baltimore City residents are participating in the ZWM

(Chapter 2). In the Summer of 2022, I investigated who is participating in the ZWM, how is the ZWM being interpreted, and who has access to the ZWM. Additionally, I assessed sustainable waste disposal practices that originate from local/indigenous knowledge in three South Baltimore communities. The next Chapter will go over the methods and results of this work.

Chapter 2: Assessing Participation of Baltimore City Residents in the Zero Waste Movement

Introduction

Globally, the United States is one of the top three producers of MSW (Nanda & Berruti 2021). On average, the US produces about 292 million tons of MSW per year (EPA, 2022). To get an adequate picture of garbage production in the US, think of this: the US is home to about 4% of the world's population, but it produces more than 30% of the world's total waste (Bradford et al., 2018). Incineration has become one of the main solutions to deal with this waste. Burning garbage has been seen as an innovative popular solution because of its potential to turn "waste into energy" (Allegrini et al., 2015). Incinerators have a process through which they can recover energy from the heat that comes from burning garbage. This has been sold to the public and governments as "green technology", considered renewable energy, and it has created a narrative of incinerators being an environmentally friendly solution to the waste/garbage crisis. Waste incineration, however, isn't a clean or green form of energy generation (Baptista & Amarnath 2017). Since they were first introduced to the US in the 1970s, waste-to-energy incinerators have released toxic gasses that exacerbate the climate crisis and negatively impact the health of people living around them (Fabricant 2018). Also, the production of energy that comes from incinerators is not significant enough to justify the cost of maintaining an incinerator open- not only are they not good for the environment and people, but they are also expensive (GAIA 2019). In 2021, about 0.1 % of electricity production in the US was generated from waste incineration (EIA, 2021). Generating 0.1 % of electricity results in more

emission of greenhouse gases than from coal-fired power plants (GAIA, 2019). Waste incineration also releases hazardous air pollutants like mercury, lead, and dioxins, which have been proven to cause serious health effects on people (Pietzsch et al., 2017, Cudjoe and Acquah 2020, Mayer et al., 2020). For these reasons, there has been a long record of activism and calls to end the incentivization and support for waste incineration.

The United States follows the global trend of placing waste incinerators in low-income communities of color, which are also referred to as environmental justice (EJ) communities (GAIA 2019). EJ communities have been continuously overburdened by pollution from facilities that release toxic chemicals, like incinerators. EJ communities have been affected by incinerators since their beginning times. Historically, incinerators in the US date back to the late 1800s. The first incinerator was placed in New York City in 1885 and their production continued to spread around mainly in densely populated areas. Incinerators were seen as an alternative to the development of more landfill- although landfilling was and is cheaper (Rogers 2005). Construction of incinerators continued to increase throughout the US and it is estimated that by the 1930s there were more than 700 garbage incinerators (Thomson 2009). Consumption patterns skyrocketed during the second half of the 20th century, especially after World War II (Leonard 2010). There was the introduction of plastics, the main contributor to the toxic pollutants released from incinerators. The burning of plastics is what heightened the negative impacts caused by exposure to incinerator pollutants. As municipal waste incinerators began to burn more materials that contained toxic chemicals, the emissions became more hazardous

and impacted the communities near them. Uncoincidentally, the communities near incinerators were the ones that least contributed to the garbage production but the ones that were affected the most.

The siting of polluting facilities like incinerators near EJ communities is a result of historic racism and zoning laws that have allowed wealthier white communities to stray away from industrial facilities and communities of color (Rabin, 1999). In 1987, one of the first environmental justice studies demonstrated that race and income are the main factors that define the likelihood of living near a toxic facility (Commission for Racial Justice, 1987). This has been proven over and over by many other studies: social indicators such as race and income are predictors for incinerator placement (Chakraborty et al., 2011, Martuzzi et al., 2010). Currently, 80% of the incinerators in the United States are placed in EJ communities (GAIA, 2019). The largest and thereby most polluting incinerators are within a 3-mile radius of predominantly low-income communities of color (GAIA, 2019). Some of the most impacted communities are located in Honolulu, Hawaii, Newark New Jersey, West Palm Beach Florida, and here- Baltimore, Maryland. Baltimore City has one of the largest incinerators in the country within a 3-mile radius of a population that is 66% minority and 50% below the federal poverty rate (GAIA, 2019). Wheelabrator Baltimore, also known as BRESCO, is also one of the three incinerators that emit the largest total amounts of lead annually in the US (GAIA, 2019). BRESCO also produces more mercury and GHG per hour of energy than each of Maryland's four largest coal-fired power plants (ILSR, 2020). One study estimated the cost of health effects caused by the BRESCO incinerator (decreased lung function, asthma,

cardiovascular diseases, cancer, and many more respiratory issues), to be about $55 million per year (Thurston, 2017). Baltimore City advocates and activists have been pushing to shut down the incinerator and urging the City government towards policies that acknowledge the principles of the Zero Waste Movement (ZWM) (ILSR, 2020).

The term "Zero Waste" was first used in the 1970s, and it emphasized recovering and recycling materials from chemical products (Palmer, 2004). Since then, the term has gained many definitions, but the overarching theme is the reduction of waste and recovery of resources with the goal of reaching a scenario where nothing goes to the waste stream. The Zero Waste International Alliance (ZWIA) has defined it as "the conservation of all resources using responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health" (2018). Zero Waste emphasizes protecting the environment and human health through practices widely known such as recycling, reusing, repurposing, and composting. The ZWM, which is also referred to as a concept or framework, is beginning a transition from a linear economy to a circular economy.

The ZWM has gained much attention during the last decade and has been held up as a potential solution to the waste crisis (Zaman 2017). The movement first appeared in Australia in the 1990s, when citizens gained interest in reducing the amount of waste that was being sent to landfills (Connett, 2013). This interest turned into advocacy, and it led to a political response as the Australian government established the "No Waste by 2010" law (Connett, 2013). This initiative on behalf of

the Australian government and citizens sparked interest in the US. In Berkeley, California a man named Danial Knapp was inspired by the work being done in Australia. He began efforts to develop a recycling operation from recovered materials from the landfill (Connet, 2013). He created a business model that aimed for total or 100% recycling, which revolutionized the idea of waste, as it began to shift from material that is unusable and discarded to a valuable resource (Connet, 2013). California and other states across the US began to adopt the ZWM. Currently, many cities in the US are making strides towards achieving zero waste goals. California and Vermont are leading the way, as both states have accomplished the diversion of waste from landfills and incinerators (Bradford, 2018).

Still, the concept of ZW is relatively new, especially when branded as such, and it is not widely understood how people are interpreting the ZWM, if and why they are participating in it, and whether there are more efficient ways to communicate it across groups of people. A study conducted by Kim-Marriot (2021) identified different levels of participation in the ZWM and suggested these were due to barriers such as lack of knowledge and/or lack of accessibility to participate. The author found these barriers to be associated with socioeconomic status and educational attainment. Another study connected household participation in ZWM-related practices directly to local/Indigenous knowledge held within those households, and not to educational outreach by proponents of ZWM (Kosoe et al., 2019). Importantly, this study demonstrated prior knowledge of some of the ZWM principles without having been exposed to the concept of ZW. The ability to connect local/Indigenous knowledge and practices within households with those practices promoted through the ZWM

suggests a critical pathway for achieving sustainability in the ZWM and the expansion of such practices, particularly in urban settings where neighborhoods are more diverse and waste production and management is intensified.

Baltimore City has been gradually working toward implementing Zero Waste policies and programs to transition away from incineration. In 2019, Baltimore City launched the Fair Development Plan for Zero Waste, which is the City's first step in integrating ZW principles into policies (ILSR, 2020). This is the outcome of a long history of grassroots advocacy and community organizing against polluting facilities, also tied to a long history of fighting against structural racism in the City.

Many have come to know of continued spatial segregation and persistent structural racism in Baltimore City through the concept of the "Black Butterfly" and the "White L", a distinction more recently coined by public health scholar Lawrence Brown to geographically visualize the deep race and class inequities in Baltimore City. The "White L" represents the gentrified upper-class white neighborhoods, centered in the middle of Baltimore, that have accumulated advantages that have allowed these communities to prosper (Brown, 2016) (Figure 1). The "Black Butterfly" represents the Black neighborhoods in the East and West of Baltimore, which have accumulated structured disadvantages that continue the cycle of inequities/disparities in Black communities (Brown, 2016) (Figure 1). These spatial patterns are manifested when various conventional metrics of socioeconomic development are mapped across the City neighborhoods, and the patterns visually demonstrate the hyper-investment and accumulation in White neighborhoods and the

hyper-disinvestment and perceived decay of Black neighborhoods. However, one key zone of the City is absent from the depiction of Baltimore's "Black Butterfly" and "White L", and that is the region of South Baltimore.

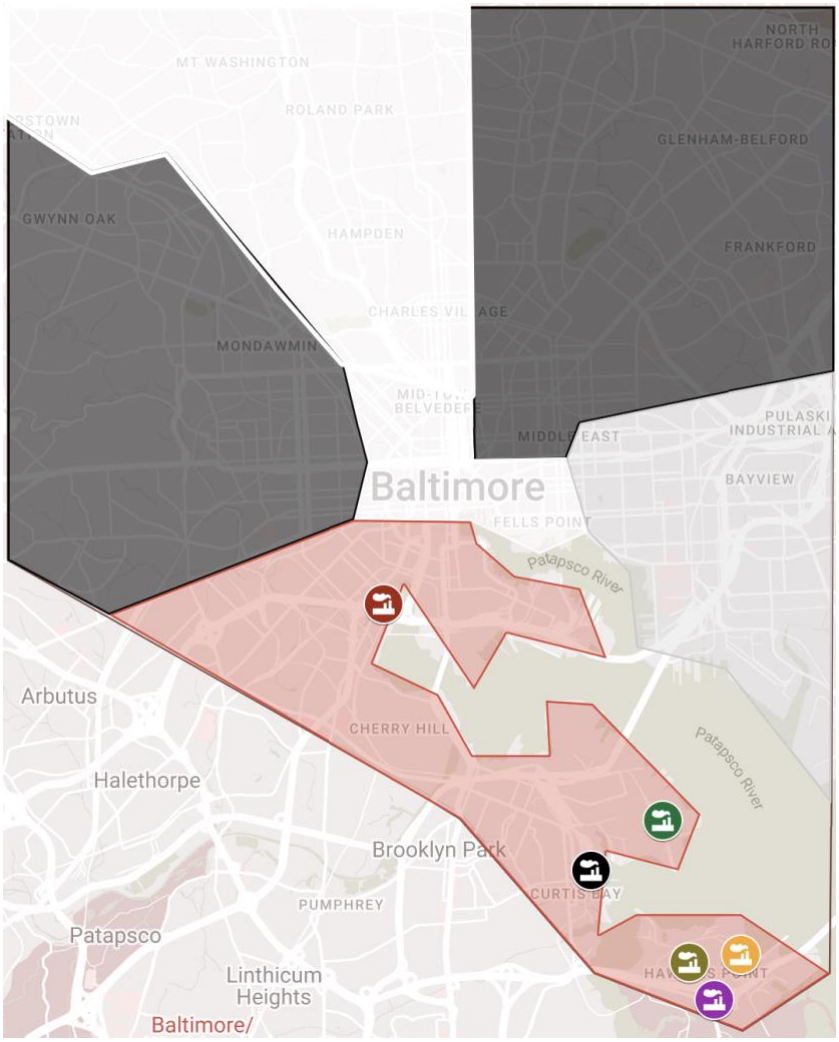

Figure 1: "White L", "Black Butterfly", and South Baltimore region with its polluting facilities

Neighborhoods in the South of Baltimore have historically been a space for hyper-industrialization (Fabricant 2018). In 1917, South Baltimore was annexed to be zoned for industrial polluters and waste services (ILSR, 2020). This allowed for many

polluting facilities to be placed in that area. Over the years, conditions as a result of chemical manufacturing became so hazardous that the communities in Fairfield and Wagner's Point were forced out for their own well-being. These communities, composed of predominantly Black residents, were displaced and separated in the name of industrialization. Currently, South Baltimore is home to the nation's second-largest coal exporting facility, which features an open-air coal pier, a waste treatment plant, a chemical and medical incinerator, a landfill, several chemical and fertilizer companies, and the worst air polluter- the BRESCO incinerator (ILSR, 2020).

Currently, there are seven South Baltimore neighborhoods that are experiencing the impacts of overpollution: Brooklyn, Cherry Hill, Curtis Bay, Lakeland, Mt. Winans, and Westport. These communities can be described as the most unhealthy and inhabitable places in Baltimore City. However, this has not stopped the communities from fighting against all this injustice. Curtis Bay and Cherry Hill, two neighborhoods in South Baltimore, have been organizing and leading movements to call for justice in the face of what they characterize as environmental racism. A powerful example of this is the grassroots movement led by high school students from Curtis Bay. In 2010, the City of Baltimore announced the Fairfield Renewable Energy Project, which was a plan to build the largest trash incinerator in the nation in South Baltimore. This polluting facility was set to be built less than a mile away from Benjamin Franklin High School and within a three-mile radius of three elementary and middle schools (ILSR, 2020). Youth leaders at Benjamin Franklin High School had formed a group called "Free Your Voice" and used it as a space to discuss topics that were important to them. Upon hearing about

the proposed incinerator, this youth group began a campaign to convince those entities that signed on to energy purchase agreements with the incinerator to divest from them (ILSR, 2020). Their campaign gained a lot of attention and power, and in 2015 they were able to convince Baltimore City Schools to end their contract with the planned incinerator (Fabricant, 2018). From that point, the campaign originally driven by "Free Your Voice", continued to grow and succeeded at transmitting the message that South Baltimore did not want another polluting facility in their backyard. In 2016, the Maryland Department of Environment pulled the permit, defeating the incinerator project (ILSR, 2020).

South Baltimore communities have demonstrated success in community organizing and have since mobilized for the establishment of what is now officially the City's Fair Development Plan for Zero Waste. As this is a policy that is in the early stages of implementation, it is important to analyze how people perceive and translate the concept of ZW, especially within the communities that are negatively affected by the incinerator and other polluting facilities. In this study, I seek to demonstrate and characterize how Baltimore City residents are participating in the ZWM through an assessment of waste disposal practices, perception of waste management and neighborhood cleanliness, and interpretation of the ZWM. Specifically, I ask:

- **Who is participating in the ZWM?**
- **How are Baltimore City residents interpreting ZW/ZWM?**
- **Who has access to the ZWM?**

An important goal of this work is to add to the scholarly research connecting waste practices and local/Indigenous knowledge, and I do so by exploring how communities in South Baltimore understand the term "Zero Waste", what ZWM-related waste practices have already existed within in these households, and where the knowledge from these practices comes from.

This research seeks to support efforts to further establish Baltimore City's Fair Development Plan for Zero Waste, including recommendations for steps to take to properly include communities that have been already fighting against the climate and waste crisis through the ZWM, and how to efficiently acknowledge the ZWM principles in new policies and initiatives.

In the remaining sections of this chapter, I present the methods and results from research conducted both across the City (through survey work), as well as from in-depth interviews with residents in neighborhoods of South Baltimore. I conclude with an interpretation and discussion of those results and a series of recommendations for further policy and management action tied to Baltimore's Zero Waste plan.

Methodology

I adopted a mixed methods approach to examine how Baltimore City residents are dealing with waste in their households, whether they feel supported by the City's existing WMS, and to understand knowledge and accessibility of the ZWM in Baltimore City. The study was divided into three parts: a) surveys with Baltimore City residents b) interviews with South Baltimore community leaders from Lakeland,

Curtis Bay, and Cherry Hill, and c) community engagement with Lakeland community members. The surveys were conducted in Baltimore City from July to December 2022. Surveys focused on a general sample group across the City to look for differences among neighborhood residents' experiences with waste in their homes and communities. Interviews focused on getting more insight into South Baltimore community leaders given their close proximity to the incinerator and the adverse effects experienced by it. The community engagement portion originated from work done in partnership with the Lakeland STEAM Center, through which we hosted various events that focused on the ZWM.

Surveys with Baltimore City Residents

I conducted a survey that acquired primary data on Baltimore City residents' perception of waste in their households, in their neighborhoods, and on the ZWM. The survey was divided into four sections and in total included eighty-two questions, with a majority of questions formatted as choice selection or ranking rather than open-ended responses (Appendix A). The first section of the survey focused on demographics such as age, education level, ethnicity, location, household size, etc. The second section of the survey focused on household garbage production and disposal methods. I assessed who was responsible for dealing with waste in a household, what type of garbage was produced the most, whether garbage was separated, whether services were provided to separate waste, and what would increase

participation in separating garbage. The third section focused on garbage and waste management in their neighborhood. I assessed the perception of cleanliness in their streets, what the most urgent issues in the neighborhood are, and the reliability of the City waste management services. The fourth section focused on knowledge of, participation in, and accessibility to the ZWM. I assessed whether Baltimore City residents had heard of the term zero waste, what they interpreted it as, whether they felt they participated in it, and what would make it more accessible.

The surveys were distributed across parks, community meetings, public events, farmer's markets, and other public spaces. Additionally, surveys were also distributed online through social media platforms and email list-serves from different organizations across Baltimore City. I required any participant to be over 18 years of age and a resident of Baltimore City. On average, it took 12 minutes to respond to the survey. As compensation for participating in taking the survey, every fifty respondents were entered into a $50 gift card raffle. Surveys were made available in both English and Spanish. I used Excel and Stata to analyze this data.

Interviews with South Baltimore Community Leaders

I conducted semi-structured interviews with community leaders from three neighborhoods in South Baltimore: Cherry Hill (n=3), Curtis Bay (n=4), and Lakeland (n=6) (13 in total) (Figure 2). I defined a community leader as someone who interacts with other community members regularly and whom community members search for advice. I worked with two community organizations to help guide me in selecting participants to interview: the South Baltimore Community Land Trust (SBCLT) and Lakeland STEAM Center. Both of these organizations have established trust with the community members and therefore it was easier to meet people willing to participate. Using quota sampling, I selected participants based on specific characteristics, including age, years lived in the neighborhood, and role as community members. I created a list of interview questions (Appendix B) but given the semi-structured nature of the interview, all participants were not asked certain questions.

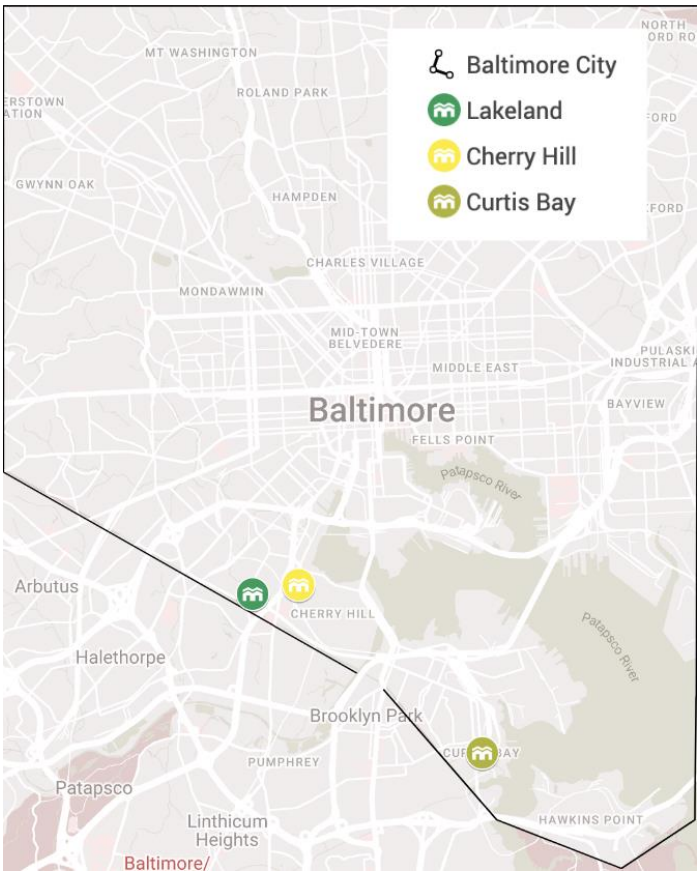

Figure 2: The three South Baltimore Communities used in this study

Participants were asked about their time spent in their neighborhood, their positive and negative encounters/interactions, the challenges their neighborhood faces, their perceptions of waste management and garbage in their household and neighborhood, and their knowledge of and accessibility to the ZWM. Interviews ranged between 27 minutes to 1 hour and 30 minutes. Participants received a $25 gift card as compensation for their time. Interviews were conducted in both English and Spanish. I used the software Otter.ai to transcribe the interviews and I analyzed them manually.

Community Engagement with the Lakeland Community

In partnership with the Lakeland STEAM Center, I used a community-engaged approach to bring awareness to ZWM initiatives in the community of Lakeland. We were able to host 6 events that brought parents, children, and staff together, and further pushed the narrative of transitioning away from incineration into the ZWM.

Results

Survey findings

The survey received 236 respondents but only 157 surveys were completed, therefore I focus this presentation of results only on the responses that were 100% completed. First, I analyzed the respondents' demographics, including age, race/ethnicity, education level, and current living situation (Table 1). In terms of age, most of the respondents were between 30 and 49 years old (44%). In regard to race/ethnicity, the majority of the respondents identified as White/Caucasian (66%).

Only 10% of the respondents identified as Black or African American. In terms of education level, most participants received a bachelor's or postgraduate degree (34% and 44% respectively). In terms of living situation, 58% of participants were homeowners and 42% were renters. The majority of the respondents have lived in Baltimore for more than 4 years (64%). I also assessed the location of participants within Baltimore City (Figure 3). The majority of the participants were from the northern part of Baltimore, also known as a portion of the White L.

Table 1: Survey Participant Demographics (n=157)		
Age	Frequency	Percentage
18 – 29	54	34.4
30 – 49	69	43.9
50 – 69	24	15.3
70 +	10	6.4
Race/Ethnicity		
American Indian or Alaska Native	1	0.6
Asian or Asian-American	11	7
Black or African American	16	10.2
Hispanic, Latina, Latino or Latinx/e	17	10.8
Native Hawaiian or Other Pacific Islander	1	0.6
White / Caucasian	103	65.6
Other	8	5.2
Highest Education Level Achieved		
Some high school	0	0
High school diploma or GED	10	6.4
Some college, but no degree	12	7.6
Associates degree	8	5.1
Bachelor's degree	53	33.8
Post graduate degree	69	43.9
Other	5	3.1
Living Situation		
Homeowners	91	58
Renters	65	41.4
Other	1	0.6

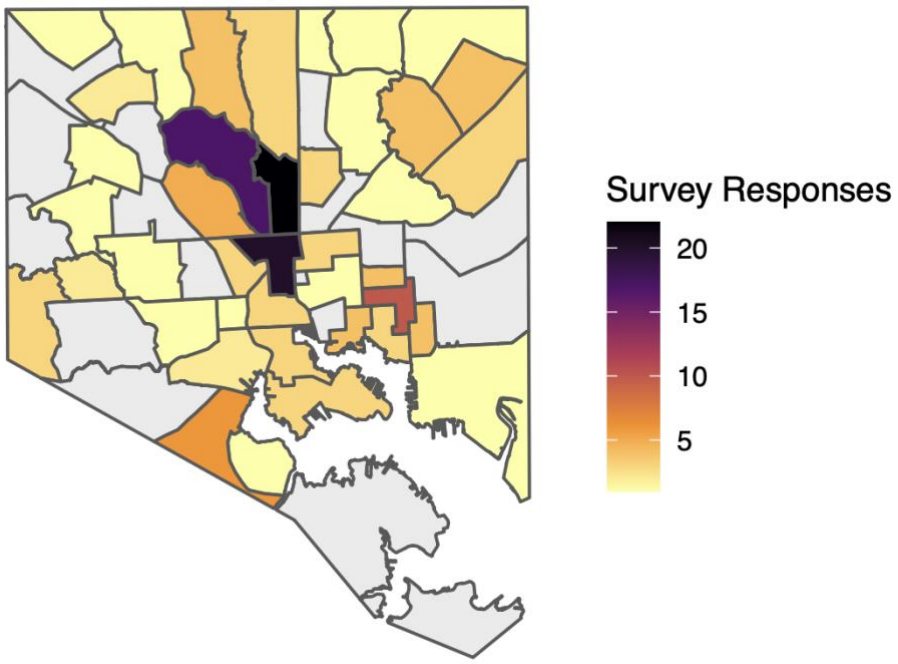

Figure 3: Frequency of survey responses across Baltimore City neighborhoods (Source: BNIA Mapping Resources)

I then analyzed the second section of the survey which asked about household garbage production and disposal methods. I used a Likert scale to rank familiarity with garbage disposal, waste separation, and types of waste produced in each household (Table 2 & Figure 4). In terms of familiarity with household waste disposal, 73% of participants responded that they were very familiar with it, meaning that they were the ones responsible for handling waste in their household. 22% responded that they were moderately familiar, and 5% responded that they had little to no knowledge about garbage disposal in their household. I then asked about waste/garbage separation, 65% responded that they separate their garbage all the time, 20% responded that they separate their waste most of the time, 10% responded

that they separate their waste sometimes, and 4% responded that they never separate their waste. For those who responded that they separate waste sometimes or never, I asked what withheld them from separating their garbage and 48% responded that there were no services in their neighborhood to deal with the garbage that is separated, 21% responded that they do not have enough knowledge about what needs to be separated, and the remaining responded with a combination of these answers. Participants were asked to rate their waste production of plastic, paper, food waste, metals, and other from 1 to 5 (least to most produced). The top three most produced types of waste were paper, plastic, and food waste (Figure 4). Metals and other materials were the least produced. Other materials mainly included glass and animal waste.

Table 2: Household Waste Management (n=157)

Familiarity with household waste disposal	Frequency	Percentage
Very Familiar	114	73
Moderately Familiar	34	22
Slightly Familiar	8	5.1
Not Familiar at all	1	0.6
Household waste separation		
Yes, always	102	65
Yes, most of the time	32	20.4
Sometimes	16	10.2
Never	6	4

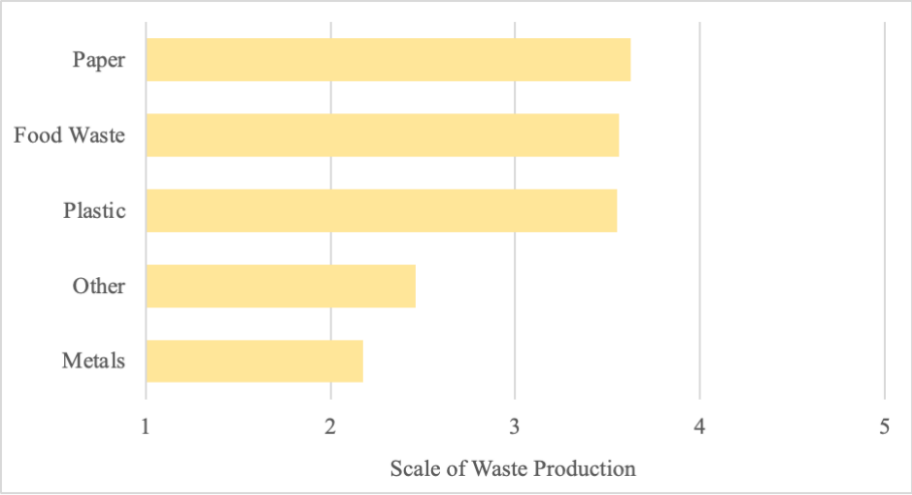

Figure 4: Production of different types of waste rated from 1 (least) to 5 (most)

I asked participants about their trash, recycling, and composting collection services and their perception of reliability. Regarding trash collection, 88% of the participants responded that their trash was collected weekly, 6 % responded that every other week and 5% responded that they needed to learn how often their trash was collected. Overall, 62% of respondents felt their trash collection services were extremely to very reliable, 29% felt their trash collection services were moderately reliable, and 8% felt their services were slightly reliable to not reliable at all (Figure 4). I then analyzed the perception of reliability by region (Figure 6). Participants from Southeast Baltimore perceived trash collection services as the most reliable (4 on a 1-5 scale) and participants from West Baltimore perceived their services as the least reliable (2.8 on a 1-5 scale).

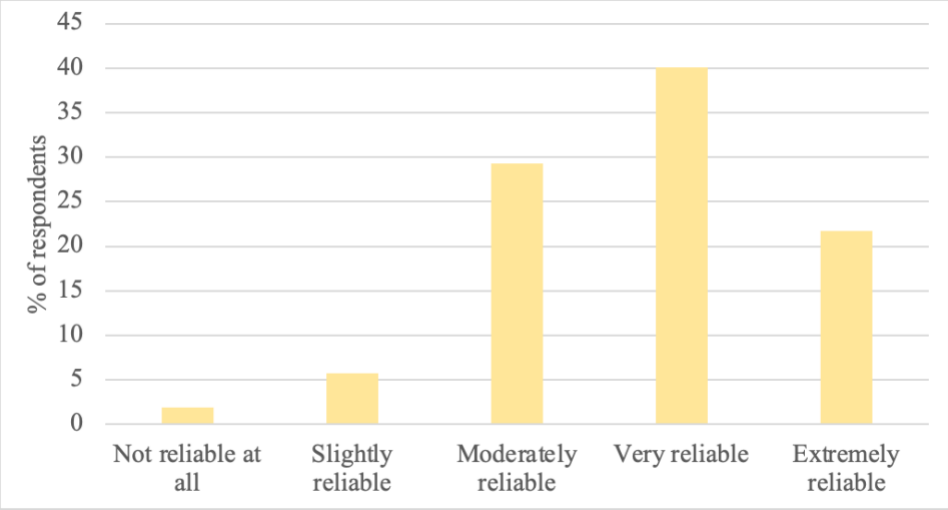

Figure 5: Perception of reliability of trash collection services provided by the City of Baltimore

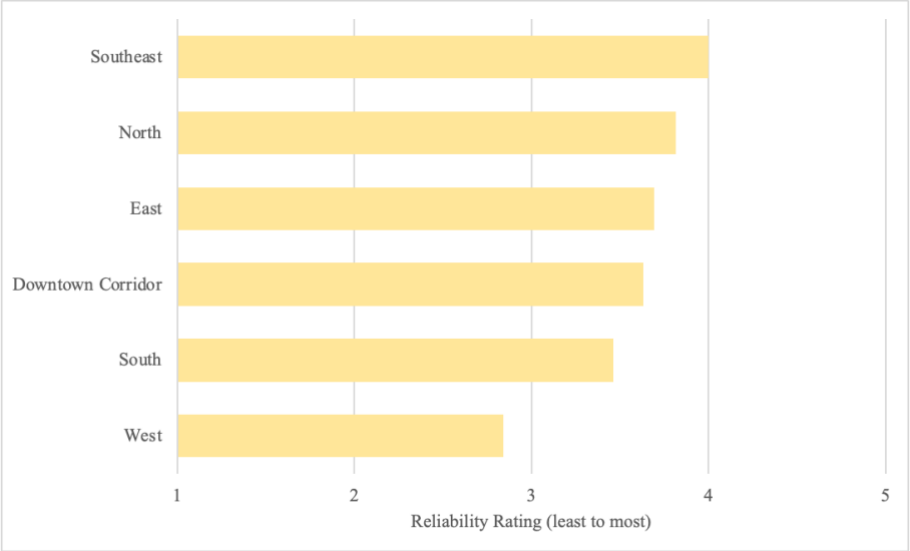

Figure 6: Perception of reliability of trash collection services by region

Regarding recycling services, 92% of respondents stated that they recycle in their homes and have services available for collection. From those that do have recycling services, 75% said that their recyclables were collected every other week, 17% said that their recyclables were collected weekly, and 5% said that they did not know. Overall, 36% of the respondents said that their recycling services were extremely to very reliable, about 40% said their services were moderately reliable, and about 25% said their services were slightly to not reliable at all (Figure 7). I then analyzed the perception of reliability by region (Figure 8). Southeast Baltimore participants perceived their recycling services as the most reliable (4.0) and West Baltimore perceived their recycling services as the least reliable (2.7).

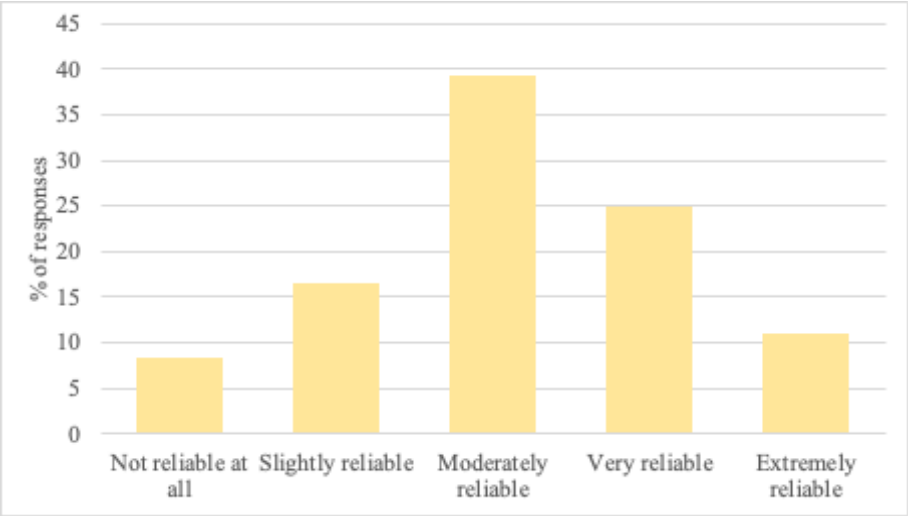

Figure 7: Perception of reliability of recycling collection services provided by Baltimore City

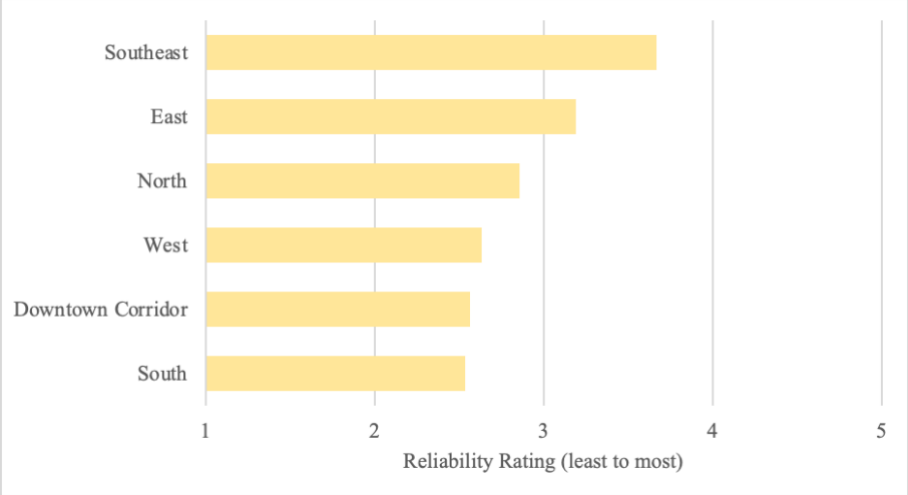

Figure 8: Perception of reliability of recycling collection services by region

When asked about compost collection services, most participants responded that they did not have that type of service where they lived (64%). However, when asked how likely they would be to use that service if it was provided 63% said extremely likely, 20% said somewhat likely, and only 9% said unlikely.

I asked participants about their perception of pollution in their neighborhood (Figures 9 & 10). Overall, the majority of participants ranked their neighborhood as "somewhat polluted" (38%), followed by "polluted" (35%). When ranked by region, participants in West Baltimore perceived their community as the most polluted (3.6) and participants in North Baltimore perceived their community as the least polluted (2.6).

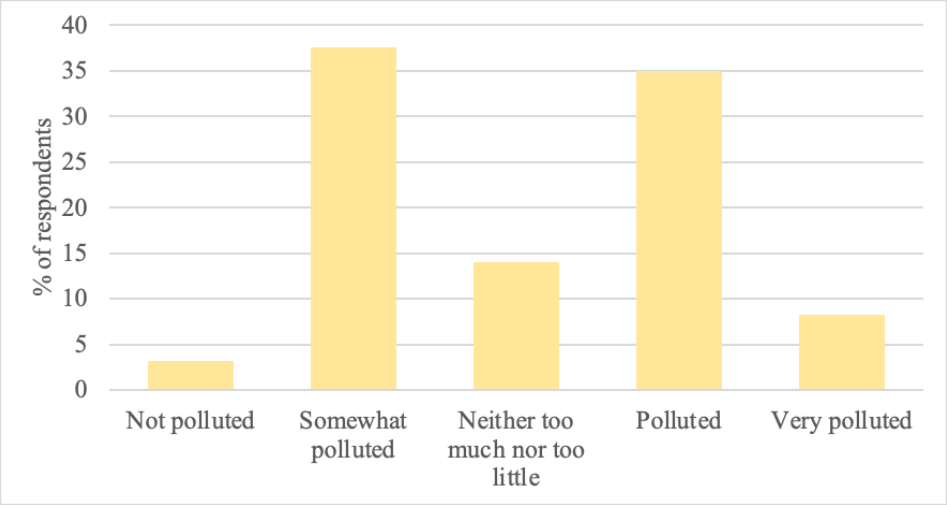

Figure 9: Overall perception of neighborhood pollution of Baltimore City residents by percentage of respondents

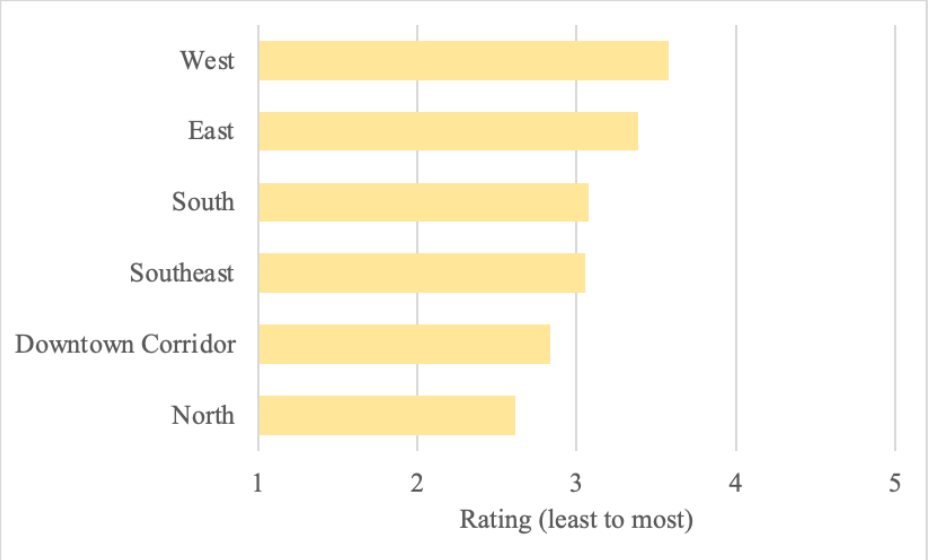

Figure 10: Perception of neighborhood pollution by region of Baltimore City residents

When asked about their knowledge of the term "Zero Waste" and the ZWM, 69% of participants said they knew what the term and movement meant, 25% responded that they did not have knowledge of either the term or the movement, and 6% responded that they were familiar but uncertain of the definitions. When asked to define the terms, participants had an array of responses. The majority of responses included language around the reduction of waste through recycling, reusing, repurposing, and composting (51%). Other participants had responses that defined Zero Waste as eradicating all waste, meaning getting rid of all the waste that is produced in a household. About 14% of the responses included language around the inclusion of a circular economy, 5% of responses included language around buying eco-friendly supplies, and 5% of responses included language relating to the implementation of policies that would reduce waste. I have chosen to feature the following responses to feature here since they help illustrate the range of responses:

1. *"Zero waste is a lifestyle practice in which every aspect of your life limits the amount (close to zero) of waste you produce"*
2. *"Zero waste is the concept of waste reduction and diversion. There are several different definitions. Some groups say that waste to energy is not part of zero waste while others accept it."*
3. *"I don't think I fully understand it in the sense that I am unsure how it would be achieved. However, I am supportive of the concept of my community and the City not producing waste that ends up in an incinerator or landfill… even if I don't know how that would happen yet. I assume there would be a lot more education around composting because when my household switched to composting, we reduced our general garbage output a lot."*
4. *"Since the '70s, I have been concerned about the environment and "sustainability" before we used that term. Getting to a fully closed loop no waste system has been a visionary goal forever."*

Additionally, I asked participants to select practices that they did at home such as: reusing plastic bags, reusing tupperware, donating clothes to family members and to stores, using reusable bags when shopping, composting, giving away food that is not eaten in their household, giving away furniture that is not being used, and buying eco-friendly materials. These are practices that are considered part of the ZWM because they reduce the waste stream. All participants of the survey stated that they did two or

more of these practices in their households. Even those who answered that they did not know about the ZWM did two or more of these practices in their household.

Interview Findings

I was able to hold in-depth interviews with thirteen community leaders from neighborhoods within South Baltimore: Lakeland (n=6), Cherry Hill (n=3), and Curtis Bay (n=4), with many interviewees having overlapping experiences in two or more of these communities. The questions we discussed were similar to the survey questions but also tried to get insight into their experiences living in those South Baltimore neighborhoods. I began each interview by asking about their background and the time they lived in Baltimore. I then asked about their experience living in their community: What did they like and not like, and what did they perceive as challenges that needed to be addressed. I then shifted to garbage-related questions about their neighborhood: their opinion on garbage in their community and whether they saw it as an issue of concern, and the reliability of waste management services provided by the City. In the last section of questions, I asked about knowledge of the term zero waste/ ZWM and the use of sustainable waste disposal practices I defined as 1) reusing plastic bags, 2) reusing tupperware, 3) donating clothes to family and friends or stores, 4) using reusable bags when shopping, 5) composting, 6) giving away food that is not eaten at home, 7) giving away furniture or household goods that are not being used in the household.

Experience living in their community

Eight interviewees have lived in Baltimore their entire lives, four of them have lived in Baltimore between 11-25 years, and 2 have moved to Baltimore within the last 3 years. Eleven of the participants identified as Black/African American, 2 identified as Hispanic/Latinx, and 1 identified as White. The interviewees had different levels of knowledge in regard to the waste crisis and environmental justice advocacy happening in Baltimore: some have been part of the fight against the incinerator and have much knowledge on the struggles of South Baltimore residents, whereas others are educational leaders/parents that had no prior knowledge of the incinerator or of the ZWM. It is important to also note that interviewees were able to distinguish between different issues faced in each community, and this was because of their experience of living in more than one of these communities.

When asked what they liked the most about their community, most interviewees from Lakeland mentioned the school and the environment. Lakeland elementary school is connected to the Lakeland STEAM Center, which is a community and recreational center, and both spaces have served as a place where residents can ask for support and get guidance. The interviewees view the school as a resource center that brings the community together. Interviewees also appreciate the environment that Lakeland provides for them, in the sense of being quiet, not too close to the City, and having access to greenery. Two interviewees actually moved to Lakeland from New York City because of the opportunities of a healthier environment that it would provide for their children.

"Pues si, yo vengo de Nueva York. Con mi familia nos mudamos en 2020. Me gustó aquí porque el ambiente, las personas son mucho más amigables. Entonces queríamos salir un poco del bullicio de Nueva York y por el bienestar también de nuestras hijas, que tienen aquí mucho más espacio para estar afuera."

[English translation] "Well yes, I come from New York. With my family, we moved in 2020. I liked it here because of the atmosphere, the people are much friendlier. So we wanted to get away from the hustle and noise of New York for the well-being of our daughters, who have much more space here to be outside."

- Mother of a student at Lakeland Elementary School

Interviewees from Curtis Bay viewed the community unity and advocacy as positive and something that was liked about living in that area. A young man, who has been part of the efforts advocating against the incinerator, mentions how there is a great sense of unity among community members because of the struggles they face. He mentioned that a class in high school changed his whole trajectory because he learned about environmental justice and is now part of a movement that aims to stand up for his community. He said *"They helped [with] a lot of stuff I had questions for…one of my main questions was why did everybody have asthma? Where I live most of the people, even in my school, [have it] and it was something that kind of just bothered me for like all of my life, and working with them helped me understand why,*

you know, why it's like this, you know, I didn't understand what the incinerator was…but working with them [has been a] really positive thing…they helped me understand how bad it was, and what the impact is on everybody who lives near it." Another Curtis Bay resident said he really appreciates the "*readiness to talk and act*" of community members. He was able to witness how Curtis Bay residents came together to stop the construction of yet another incinerator back in 2010. It is important to note that much of the advocacy happening in Curtis Bay is community-led, emphasizing the importance of community participation.

Challenges

When asked about the challenges their neighborhood is facing, a couple of interviewees from Lakeland mentioned the clash between the African American community and the new incoming Latinx community. Lakeland is currently experiencing high numbers of migrants from Latin American countries. Two of my interviewees are Latina mothers who moved to Lakeland in search of a better life for their children. Interviewees who have been living in Lakeland for more than 10 years have noticed this clash of cultures and attributed it to the lack of information about each other's cultures and the language barrier. Another issue challenge brought up was the lack of support from the City of Baltimore. One of the Latina moms mentioned the lack of attention the community receives on behalf of the City, and she perceived that as a major challenge. She said "*el desafío más grande de la comunidad es hacerse escuchar por la ciudad…que vengan a hacer. Que presten más atención*".

[English translation] "The biggest challenge for the community is to make themselves heard by the city…let them come and do it. Pay more attention".

She mentioned that they brought up an issue of cars passing by too fast next to the school, therefore making it dangerous for the children that walk home. Parents got together and collected signatures, yet still, nothing has happened in regard to that issue.

Related to this last point, interviewees from Curtis Bay mentioned that a major challenge for their community is the false promises that legislators make to their communities. A woman who has been part of the efforts to establish the Plan for Zero Waste mentions how the lack of support from politicians has led community members to be skeptical of the movements that are happening in South Baltimore. She says "*Politicians continue to turn a blind eye or give false promises just because this area is so complex. It's like we've just been ignored because it's too much to deal with. There are too many complications. So, it's like, alright, we're not gonna touch that. We're just gonna act like we don't see them and bypass them, and for us to have to keep bringing up What about Curtis Bay? What about Brooklyn? What about our neighborhoods? It's disheartening."* Similarly, another interviewee mentioned this same frustration. He mentions how officials whose stated mission is to safeguard the health and environment of all residents, have been represented with nothing but avoidance and "outright lies". This has led to the creation of a narrative of South Baltimore communities as less important. He says "*The identity of this place is to be used as a dumping ground. And we either do not believe or cannot bring ourselves to believe anymore that that's going to change…that's the people taking the real*

experience and then expressing and what's negative about it is the reality of the way that the government and corporations have functioned together to create that."

When talking to community leaders of Cherry Hill, each interviewee mentioned a different challenge. For one interviewee, a primary challenge is access to healthy food and transportation. She mentioned that it was when she went to college that she found out this was an issue. Seeing the access others had to food that was actually good for people's health surprised her. She says "*What do you see when you drive here? You see a Taco Bell, you see a Popeyes and there's nothing wrong with them. Don't get me wrong. It's a full selection, but it's like, nothing healthy at all. The options are very limited. I have to say living in Cherry Hill is absolutely nothing there".* Another interviewee mentioned the reluctance of community members to participate in certain community activities that are meant for the improvement of the community. She brings up an example of her own initiative which is a youth empowering workshop, that originally was meant for Cherry Hill youth, but due to lack of participation, had to offer to other areas. Now she works with other South Baltimore communities but not as much with Cherry Hill. Another interviewee related this to the fact that a major challenge in Cherry Hill is *"all things that come with oppression",* which results in this reluctance to engage in community activities. He specifically focused on the psychological result of oppression, through which being socialized as so-called "minorities" creates a psychology of inferiority. If people have been led to think of themselves as less than others, then there is less want to engage. He says, *"The built environment will help to shape how [we] see*

[ourselves]", demonstrating how structurally the socialization of people can lead to a lack of engagement.

Opinions on garbage in their community

Every interviewee had a different opinion about garbage in their neighborhood. The majority of Lakeland interviewees did not see it as much of an issue. One interviewee called Lakeland a *"palace*" compared to other South Baltimore neighborhoods because he does not see abandoned cars, broken glass, and a lot of trash in the streets. Similarly, another interviewee that has worked in Brooklyn/Curtis Bay and Cherry Hill perceives Lakeland as clean saying that *"parents are doing a good job at keeping their areas clean. But that doesn't mean that things couldn't be reused, recycled, or repurposed in some other kind of way*". This interviewee sees the opportunity of improving how waste is treated. Two other interviewees did see garbage in their neighborhood as an issue of concern. An elderly woman says that there is a lot of trash in her street and that because recycling services are not reliable more trash builds up in the streets. Another interviewee brought up pests and how garbage accumulation has attracted more rats, which she is worried could bring diseases. Another interviewee also brought up rats and mentioned that there have been efforts to involve the City but no changes have been made. She says *"We've had to call 311 on several occasions to come out. But the thing of it is they want you to find holes in your yard. And that's the only way they [provide] service [to] you, not just by you saying that it's something that you've visually seen or*

whatever. And I think that probably makes people very apprehensive about even reaching out."

All interviewees from Curtis Bay mentioned that they perceived garbage as an issue of concern in the neighborhood. One interviewee mentioned garbage as an issue because of the rats and pests that it attracts. She mentions that she has seen more rats than ever and that the City has been called many times about it but not much is done. Another interviewee mentioned that yes, garbage is an issue and that he wishes there were more systems to support the issue in his neighborhood. This youth leader brings up an example of how the community in Curtis Bay built a community park in an empty lot, and how they made sure to include a compost bin, a recycling bin, and a trash can. He wished he would see more of these in his neighborhood. He says *"if we had more in this area, it would be a lot better. I've seen most of them in certain areas like Fells Point, Federal Hill, things like that, but not too many in the Brooklyn/Curtis Bay or most of the South Baltimore areas."* Additionally, this interviewee mentions another community-led example that if the City was to implement could be beneficial in reducing garbage in different neighborhoods. He is part of the Baltimore Broken Glass initiative, which is a youth-led program that collects glass and turns it into art. He says "*we went out to the community to let people know about this, and they seem to love it, they love the art. And not only that, we asked them, "Hey, do you have any glass bottles, instead of throwing away, you can just give it to us". And we created something for them to actually place all their glass bottles in And they've actually been contributing a lot of their waste to us. If the city started doing this it'd be really positive."*

Interviewees from Cherry Hill had different perceptions of garbage in their neighborhoods. Two interviewees mentioned that they do not walk around their neighborhood enough to notice whether it is an issue. Both of these interviewees said that within their complex, community members hire a designated person to clean their community. This is an effort by community members themselves that come together and hire a person to clean up. There are similarities and differences between Lakeland and Cherry Hill. One of the interviewees, who works at Lakeland but lives in Cherry Hill, mentions that both communities do not have enough access to public trash cans and recycling bins that she would otherwise see in downtown/inner harbor. However, she attributed the cleanliness of Lakeland to the community efforts to clean it up, which she thinks are not as frequent in Cherry Hill. Another interviewee perceives garbage as an issue in his community but attributes it to the structural system. He says *"I think we have a larger issue with the way in which capitalism produces and reproduces waste".* He mentions that systemically residents of Cherry Hill are placed in a cycle of consumption that becomes an addiction which leads to the overproduction of garbage. Again, going back to the psychology and socialization of people, he says "*racial capitalism puts us in a position where black and brown and poor people are larger consumers or largest consumers, by percentage, not by numbers, but by percentage, which causes us to continue with the cycle. We are the most preyed upon in terms of you know, [the corporations] need those people to consume, those people meaning us to consume and then [they] put the landfills and [they] put the incinerators in OUR communities."* This interviewee sees garbage as an issue that is the result of racialized capitalism.

Perception of reliability of waste management systems

All of the participants from all three neighborhoods mentioned the City waste management services were not reliable. Interviewees from Lakeland mentioned that the pickup days have been inconsistent since the onset of the COVID-19 pandemic. Trash collection services have been reduced to once a week and recycling has been reduced to once every two weeks. Many complained that the recycling services are very unreliable, and therefore fewer people participate in them. Additionally, interviewees mentioned that the trash and recycling bins are not big enough to hold all the garbage that is produced during the weeks. One interviewee pointed out that if residents leave bags outside of the bins it does not get picked up. This leads to further accumulation of garbage in the streets and alleyways, increasing pest presence. Another interviewee mentioned that the lack of reliability is because of class and race. She says *"When I think about the City as a whole, some parts of the City get their trash picked up on time and some parts don't. Some pickup bulk trash in a reasonable amount of time, but some parts of the City don't"*. With this, she attributes the difference in pick-up days and times to the race and class of different regions in Baltimore City, but she also mentions the unreliability goes beyond just waste management systems She brings into example an E.Coli outbreak that happened about a week before the interview. She became aware of this issue the night before school through the news. The City did not properly support the schools to manage the situation. She says *"we have not gotten full guidance as to what to do exactly. No one*

has taken a break to give us guidance on what to do… [Teachers are] supposed to manage all this, but [the City] gave us no tools and no turnaround time to put the tools in place. We just came the next day, and [the City] just said "You're gonna wash your hands and put hand sanitizer on" and I'm stuck. But what about when [the children] are home? You take a shower and then put sanitizer over your whole body?" Again, she attributes this treatment to being part of South Baltimore and being a community that is always neglected.

Interviewees from Curtis Bay also mentioned the unreliability of the City services in general. One participant mentioned two instances where she called for City services. She called about potholes on her street and no one from the City has come to address that issue. In another instance she called for bulk trash pick up, received a date for 45 days later, and on the day that they were supposed to pick it up, they canceled the appointment. When this interview was conducted the interviewee still had the bulk trash in her alleyway. She mentioned that this is what over time causes the accumulation of trash and what attracts pests to the neighborhood. The youth participant mentioned that he wished that there was a better system for trash. He says "[*the City is] saying well if you see waste or anything like that contact [them] at a certain number, you know, but it's like, does that really work? You know, will they really come out there immediately? We've called for certain things before and things are still there after we call"*. Another interviewee mentioned how the City has multiple waste management systems without a great deal of coordination which is the reason for the unreliability. He brings to attention how the City has to enforce certain

practices- an example he uses is enforcing landlords to provide recycling containers for tenants. The City does not do a good job of enforcing this and leaves the choice to the landlords. He says *"Landlords quickly learned that there's no accountability. And so they're gonna go with the with, either what might be the cheaper option or maybe it's not even the cheaper option. Maybe they just do trash*." This example shows how a lack of oversight by the City can lead to more trash going into the incinerator and less participation in recycling initiatives. The City does not hold people and institutions accountable and thereby they are unreliable.

Public health impacts

All interviewees mentioned seeing or experiencing the health impacts caused by the over-pollution in South Baltimore, whether or not they had knowledge about the incinerator. One interviewee from Lakeland, who has worked in Curtis Bay, and Cherry mentions how one of the first things she noticed after moving to South Baltimore was the prevalence of children with asthma. Over half of her classroom in the three communities had asthma, and she raises the concern of how parents are being informed about these issues, especially in Lakeland given the language barrier. Physically, she has also been to see an effect on herself. she says "*[My] allergies are unbelievably off the chart. I genetically have allergies. I suffered from hay fever. However, I'm supposed to have a season where I'm good. But since I've been working in South Baltimore, my doctor says, I don't have a [off] season anymore. And when I told him where I worked, he said that's why. That it makes sense*".

An interviewee from Curtis Bay mentions that since moving to South Baltimore she has developed severe allergies and that doctors cannot identify especially what it relates to. Most of her family has asthma and in 2018 her mother almost passed away due to contracted pneumonia. She has witnessed her neighborhood pass away from lung cancer. She says "It *was very shocking. And very quick. And it just made me think, like, if we lived anywhere else, would her life expectancy have been longer? …where we live really could, or really is affecting our health. And no one's taking it seriously…Why does our community have to be overburdened by so many facilities?"* She also brings up the irony of having so many hospitals in Baltimore City and the medical incinerator in South Baltimore. She says "*It's ironic, hospitals are meant to save lives but the burning of their waste is killing peopl*e".

An interviewee from Cherry Hill mentions how he has witnessed all-time high numbers of cancers, respiratory issues, and asthma among community members in his community. He also speaks about the negative impacts beyond what you can physically see and mentions that the waste systems are also very related to mental health impacts. He attributes the lack of engagement and participation to the mental health effects caused by the placing of polluting facilities near communities and on the socialization people Black people. He says *"If I can't even see myself as powerful, why would I even try to change it? … when you don't see space for yourself, of course, it causes you to back up…These are the direct and indirect health concerns and issues related to systems of waste."*

Knowledge of the ZWM and local knowledge

Lakeland community leaders had the least knowledge of the ZWM. A couple of interviewees defined the ZWM as getting rid of all waste, which they thought was unachievable. Others related the ZWM to reducing waste that we produced. However, all of the interviewees did three or more of the sustainable disposal practices in their households. When asked about where they learned those practices, some mentioned passed-down traditions, and some grew up in poverty or learned from others that grew up in poverty. One interviewee, who did not even know about the incinerator, mentions how he created a reusing and repurposing program for youth in Lakeland. Currently, he is a sports coach and says that he repurposes gear from older players to younger players. His main goal is to help the community and steer youth away from drugs. Here is an example of how someone can participate in the ZWM without knowing it. His reasons stem from trying to help and empower the community, not to help the environment or better the waste crisis.

All of the interviewees from Curtis Bay had prior knowledge about the ZWM. One interviewee mentioned that when she first learned about the ZWM she was skeptical. She had seen a YouTube video that showed how a person kept all their waste in a mason jar, and that was defined as ZW. The interviewee thought that it wasn't feasible but then through her work learned that the ZWM meant *"being conscious of what we buy and how it can be reused"*. She also mentions how the ZWM tends to get whitewashed - making it seem like it's a new concept when in reality people have been doing this. She says "*we've been doing different things to*

help ourselves for years and decades, but you know, just didn't call it [zero waste]. It's kind of like the Columbus thing". She learned about sustainable waste disposal practices through her family and her church- she learned that she was raised on the thought that "*it is better to give and receive*". All other interviewees also did sustainable waste disposal practices in their households. They attributed this knowledge to growing up with a lack of resources. The youth interviewee said, *"it's like growing up and not having too much, you want to make sure you use everything you have.*"

Knowledge about the ZWM varied amongst every interviewee in Cherry Hill, but they all mentioned they did practices in their household that are ZWM-related. One interviewee described the ZWM as "*really working against the nature of consumerism.*" This interviewee has previous knowledge of the ZWM and mentions that people in Cherry Hill are participating in it not because of environmental factors, but because of cultural practices, certain beliefs and values, and poverty. He also mentions that the legitimization of these practices as part of the ZWM is devalued by white supremacy and the socialization of people in South Baltimore communities. He says "*we talk about zero waste… to be able to say, look, we don't need to do it your way to be legitimate. We already do it. And here are the ways that we do it. But understanding the nature of white supremacy, it makes sense that we would not see value in the way that we do things because it's a part of our socialization."* Another interviewee did not know about the ZWM but defined it as the avoidance of creating waste. When asked about sustainable waste disposal practices being done in her household, she said she did all of them except composting. She attributes the

knowledge of these practices to the teachings of her parents and religion. She said that in her religion people are not supposed to create waste. Additionally, she also attributed knowledge of these practices to growing up with a lack of resources and therefore learning to sustain materials for longer periods of time. When asked about barriers to the ZWM, she mentioned that there is a lack of information about it.

Community Engagement with the Lakeland Community

Upon learning about the incinerator and its negative effects, what the ZWM is, and ways in which they are already participating in it, community members of Lakeland have become more involved in the efforts to mobilize action to close down the BRESCO incinerator and to look into implementing practices promoted by the ZWM. I have been able to assist in the facilitation of multiple events around this topic. The first event happened after an initial conversation with the Director of the STEAM Center, Brian Francoise. In this initial conversation, Brian first learned about the ZWM and about the impacts of the incinerator. Our first event focused on the ZWM and introduced this topic to community members. We hired two moms of students from the Lakeland Elementary school to cook dinner and bought reusable tableware sets for every participant. We informed the participants of this about what the ZWM was and how it is present in South Baltimore. Many participants were interested in learning more about it and we decided to host a second event.

Our second event was in partnership with the Baltimore Composting Collective, which is a youth entrepreneurship program run by Marvin Hayes in Curtis

Bay. Mr. Hayes created a unique model for youth-led composting where he hires and trains local youth to compost at the Filbert Street Garden. He hosts workshops to teach others about this initiative and the wonders of composting, however, this workshop has not been available in Spanish. Given the majority of community members at Lakeland speak Spanish as their first language and in learning more about the ZWM, we hosted the first bilingual composting workshop. Through this workshop, local moms from Lakeland learned about the importance of composting, but they were also able to relate it to their background, as many mentioned that they had learned about it in their country of origin.

As a result of this workshop, we hosted our third event which was a trip to the Filbert Street Garden. More than 45 people attended this event. Here, children and parents brought in their food scraps and learned how to compost. Again, this was the first bilingual tour of the Filbert Street Garden. Both parents and children interacted with the soil and nature. As a result of this event, parents gained interest in having a community garden in Lakeland, which led to our next event.

Our final event was a workshop to envision what a community garden would look like in Lakeland. We have over 20 participants that brought in ideas for what they would want to see and plant in a potential community garden. Internally, we had conversations about potentially hiring one of the moms that constantly participates and shows interest in the garden as a garden manager.

These efforts continue today. Lakeland STEAM Center is working towards opening the community garden this summer. This takes organizing efforts to spread

responsibility amongst community members that are interested in participating. There is also the potential of creating the first compost station in Lakeland in partnership with the Baltimore Composting Collective.

Discussion and Conclusion

Through the surveys and interviews, I was also able to point out differences between regions of Baltimore City and between South Baltimore neighborhoods. Additionally, through the community engagement portion, I was able to emphasize the importance of community participation. I was also able to collect enough evidence to respond to my three research questions: 1) who is participating in the ZWM, 2) How are people interpreting the ZWM, and 3) who has access to the ZWM?

Differences in regions

Through the survey results, I was able to demonstrate differences in the perception of the reliability of waste management systems and the perception of neighborhood garbage pollution by region. In terms of the perceived reliability of trash collection services, respondents from the Southeast and North regions of Baltimore perceived systems to be more reliable (Figure 4). Neighborhoods in these regions are part of the "White L", which are neighborhoods that are wealthier and gentrified, and therefore can result in receiving better services. The West and South regions of Baltimore perceived trash collection services as less reliable. Neighborhoods in the West region of Baltimore are part of the "Black Butterfly", which are neighborhoods that have been historically neglected by the City (Brown

2016). The South region of Baltimore experiences high levels of pollution and has also been historically neglected by the government (Fabricant 2019). In terms of perception of neighborhood pollution, the West Baltimore participants perceived their neighborhoods as more polluted, and the North Baltimore participants perceived their neighborhoods as less polluted (Figure 8). Again, the West region of Baltimore is part of the "Black Butterfly" and the North is part of the "White L". These results demonstrate how Baltimore residents experience a difference in both services by the city and the cleanliness of their neighborhoods, which can be based on race.

Differences and similarities between South Baltimore neighborhoods

In terms of advocacy and environmental justice organizing, Curtis Bay and Cherry Hill have been leading environmental justice campaigns, while Lakeland has not been as involved. In terms of knowledge of the ZWM, Lakeland interviewees did not have much background on the ZWM, while Curtis and Cherry Hill have leading anti-incinerator and ZW-related efforts.

In terms of similarities, all three communities have community-based organizations that provide more support to residents than the City services. These community-based organizations are essential for the implementation of ZWM efforts. Furthermore, all three communities experienced neglect by the City. Interview participants in all three communities mentioned the lack of support and neglect that they face from the City. In order to better implement the Plan for Zero Waste, there needs to be more support for South Baltimore communities. Moreover, participants

from all three communities had knowledge of ZW-related practices, however, this stemmed from different reasons- including religion, passed down knowledge, and lacking resources. Including these practices in ZWM-related information could potentially empower communities that have knowledge of ZW-related practices and reinforce ZW efforts.

Who is participating in the ZWM?

In terms of who is participating in the ZWM, everyone who did a survey or an interview is participating in the ZWM. The ZWM movement focuses on the reduction of waste that is produced. When asked about sustainable waste disposal practices, in the survey all participants answered that they did two or more practices, and in the interviews, all participants answered that they did three or more of the practices. However, not everyone knows that they are participating in the ZWM. In the surveys, 31% of participants mentioned they had not heard or were unsure of what the ZWM was and yet they still selected two or more of the sustainable waste disposal practices. This shows that even though people do not know about the ZWM, they still participate.

Similarly, in the interviews, community leaders who said they did not know about the ZWM still did three or more sustainable waste disposal practices in their households. Most interviewees attributed the knowledge of these practices to growing up with a lack of resources and passed down traditions. This means that ZWM-related practices are present in these communities but are not learned as a result of

environmentalism but rather survival. Interviewees mentioned that even though they are no longer in a position of low resources, they still maintain these practices because it makes sense to 1) save money and 2) not create waste. This is local knowledge being passed down through generations in order to be more economically successful however, after learning about the incinerator and the effects it has on South Baltimore communities, interviewees mentioned that it will remain a practice in order to reduce waste from going into the incinerator. Becoming aware of the issue that the incinerator causes for their communities, led to the participants making a commitment to continue to engage and follow ZWM-related practices.

How are people interpreting the ZWM?

There are many different interpretations of the ZWM. Through both the surveys and the interviews, the main interpretation of the ZWM is the reduction of waste, which is beneficial because people will be more inclined to participate in it. Others interpreted the ZWM as the eradication of all waste, which seems to disengage people from participating because it does not seem feasible. This shows that there needs to be more access to education and information about the ZWM. Although many had different interpretations of the ZWM, people still participated in it. When I pointed this out to the interviewees, they mentioned that they felt surprised and empowered. Many of them were not participating in the ZWM because of environmental factors or because they were

Who has access to the ZWM?

Access to the ZWM varies throughout regions. In the survey, I asked questions about access to trash collection services, recycling collection services, and composting collection services. Every survey participant has access to trash collection, but numbers declined in terms of recycling services, and much more for composting services. Recycling and composting are core parts of the ZWM, yet not everyone had access to them. Additionally, when asked about the reliability of these services, survey participants rated the trash services as very reliable, while recycling services got rated as moderately reliable. The reliability of recycling services plays a big role in who has access to the ZWM and therefore who is participating in it. Additionally, although most survey participants did not have composting services, they mentioned that they would be more likely to use these services if they were provided. This shows that creating access to these types of services can lead to more participation in the ZWM.

South Baltimore communities seemed to perceive waste management services provided by the City as less reliable than those who responded to the survey, who were predominantly from white neighborhoods. Interviewees mentioned that they were able to see differences in services provided in more affluent communities versus those in South Baltimore. This can be attributed to Baltimore's long history of racism and classism. The lack of reliability of waste management systems in South Baltimore can lead to less access and participation in the ZWM, however, South Baltimore community members have greater access to the ZWM through their community-based organizations.

Importance of Community Participation

Community participation is very important for transitioning into the ZWM> In Lakeland, community members demonstrated the need and want to learn about ZW-related initiatives. One conversation about the ZWM with community members led to the opening of a community garden and this could not have been possible without community engagement. Lakeland STEAM Center follows a very unique model that allows for intergenerational work- providing parents with childcare and other incentives to participate. This support has allowed community members to continue to participate and create a change in their community.

As Baltimore City continues with the efforts of implementing the Fair Development Zero Waste Plan, it is important to understand how people are participating and interacting with the ZWM. Through this Chapter, I was able to analyze how Baltimore City residents are participating in the ZWM and found that there are many aspects that need to be taken into consideration in order to better transition from incineration to ZW-related systems. People are actively participating in the ZWM through practices being done in households. However, there is a lack of knowledge as to what the ZWM is, and therefore do not relate their practices to the ZWM. Showcasing that people are constantly participating in the ZWM could be a form of empowerment that could positively reinforce participation in the ZWM. There also needs to be better access to the ZWM, through both government and community-based organizations. Accessibility to more resources relating to the ZWM can also help increase participation in the ZWM. Lastly, constantly engaging community members can provide support for their participation in events and can

further help with the transition into the ZWM. All these aspects should be taken into consideration to better implement the Fair Development Plan for Zero Waste.

Conclusion

As cities across the U.S. begin to transition away from waste systems like incineration to more sustainable systems that include the ZWM principles, it is important to understand how the public is understanding and participating in the ZWM. Baltimore City serves as an example of a city that is beginning to transition away from incineration. Given Baltimore's complex history of racism and classism, certain communities have noticed that they are often neglected and lack access to reliable services or attention. South Baltimore communities are an example of this because of the industrialization that happens around them, having displaced some through zoning and subsequent pollution, and effectively obscuring those that remain from view by the rest of the City. South Baltimore communities are among some of the most polluted communities in the country because of overburden from many toxic facilities. However, these communities have been fighting and standing up for themselves. As a result of community efforts, Baltimore City launched the Fair Development Plan for Zero Waste in 2019. However, there is little to no knowledge of how Baltimore City residents are understanding the ZWM and therefore there is little to no knowledge of how Baltimore City residents would include ZW-related initiatives in their household and neighborhood decisions.

In this thesis, I explored the current waste management systems used in the US and highlighted their flaws, discussed the more sustainable and efficient waste management options under the ZWM, and assessed how Baltimore City residents are participating in the ZWM. Chapter One set the foundation for understanding one of

the most commonly used waste management systems within the US, incineration. I demonstrated the negative impacts it has on both the environment and public health, as incinerators release GHGs that exacerbate the climate crisis, and other pollutants which result in respiratory issues, asthma, cardiovascular issues, and cancer for people that live near them. I also introduced the ZW framework/movement and highlighted the alternative systems that can be used such as repurposing, composting, and reusing programs. I also brought into the conversation what is needed for sustainable waste management systems to be efficient and effective, which are the inclusion of local/Indigenous knowledge and community participation.

In Chapter Two, I specifically focused on Baltimore City, as there have been recent efforts to transition away from incineration and into systems that include ZWM initiatives and principles. Through surveys and interviews, I assessed who is participating in the ZWM, how are Baltimore City residents interpreting the ZWM, and who has access to the ZWM. The survey targeted a more general audience- Baltimore City residents. The interviews focused on three South Baltimore communities: Lakeland, Curtis Bay, and Cherry Hill. I was able to demonstrate that every participant was already participating in the ZWM however, not everyone was aware of it. Some participants did not know what the ZWM was yet still mentioned they did some of the sustainable waste disposal practices I asked about. Through interviews, I found that people maintained these sustainable waste disposal practices due to a variety of factors- some people learned about them through passed-down traditions that originated from local knowledge. Others maintained these practices because of economical reasons- some grew up without many resources and learned to

reuse and repurpose materials. Through both surveys and interviews, I was able to assess accessibility to the ZWM and found that participants relied on city services to participate in certain initiatives such as recycling. When asked about the reliability of these, survey participants said that they were moderately reliable, however, most of the respondents were from white affluent neighborhoods. Most of the interviewees mentioned their recycling services were not reliable and that the city needed to provide better services for their neighborhoods. Additionally, community organizations played an important role in accessibility to the ZWM of interviewees. Curtis Bay interviewees, who are very aware of the ZWM, mentioned that the South Baltimore Community Land Trust provided many opportunities to learn and participate in the ZWM, an example of this is the Baltimore Broken Glass initiative, which encourages community members to collect and donate their glassware and youth turn it into art. Furthermore, the importance of community participation was highlighted through the community-engaged work in the Lakeland community. This portion of the research demonstrated how consistent engagement with community members can result in change and advocacy for the community.

Policy recommendations

Given the results of the survey and interviews, I suggest four potential actions that can help better integrate the Fair Development Plan for Zero Waste in Baltimore City 1) better collaboration between government, institutions, and community-based organizations, 2) providing better waste management services that focus on divesting away from incineration, 3) educational campaign on the ZWM, and 4) inclusion of

language around local knowledge and practices that people might already be doing within their households.

1. *Collaboration between government, institutions, and community-based organizations*

   There is a need for better collaboration between government, institutions, and community-based organizations. Community-based organizations are efficient in leading work in their communities. This is because community-based organizations have gained the trust of community members and are able to better communicate with them. In order to better implement ZWM-related initiatives in Baltimore City, government agencies and institutions, such as universities, need to provide support to community organizations that are already leading this type of work. Furthermore, there needs to be better collaboration across community-based organizations. Many organizations are doing great work but are not collaborating with each other. I suggest creating a coalition of community leaders in community-based organizations to share ideas and efforts in regard to the ZWM.

2. *Better sustainable waste management services*

   Given the perception of the lack of reliability of waste management systems provided by the City, I suggest the implementation of better waste management systems that specifically focus on diverting waste from the incinerator and landfills. The City can partner with community organizations

that are already providing these services to their community (i.e. Baltimore Composting Collective, SBCLT & Baltimore Broken Glass) and replicate them across the City. Additionally, I suggest more support for South Baltimore communities in regard to current waste management services provided by the City

3. *ZWM educational campaigns*

There is a need to better inform the public about what the ZWM is. Although many participants in both surveys and interviews thought they knew the definition of the ZWM, some of the interpretations were not correct. These wrong interpretations can lead to reluctance in participating in the ZWM in the future. An educational campaign can be introduced through community-based organizations, schools, and public events- in partnership with the City and institutions. This can ensure future participation in the ZWM.

4. *Inclusion of local/Indigenous knowledge in ZW efforts*

South Baltimore communities demonstrated to have very valuable knowledge in regards to ZW-related waste disposal methods. Although the reasoning behind these practices was not directly related to advocacy against the incinerator, it is important to recognize that this knowledge is valuable. Including acknowledgment of this knowledge in ZW efforts can incentivize people to continue to participate in the ZWM. This form of empowerment can help further push the ZWM in Baltimore City.

Limitations

There were a couple of limitations to this research. In terms of the survey, the majority of the participants were from the northern parts of Baltimore City and identified as white with either a bachelor's degree or a post-graduate degree (Table 1). These participants are part of the "White L" which includes the wealthier, more gentrified neighborhoods. Knowledge about the ZWM can be attributed to accessibility to education and overall privilege. I would like to have had a more representative sample size for the rest of the regions of Baltimore City. This would help get a more accurate understanding of how Baltimore City regions differ in regard to participation in the ZWM.

Similarly, I would like to have had a more representative sample size of interviewees across South Baltimore neighborhoods. I centered my engagement in three South Baltimore neighborhoods, and this was because of the partnerships I made with the Lakeland STEAM Center and the South Baltimore Community Land Trust. I wanted to ensure I was interviewing people who had a relationship established with the community organization and thereby felt comfortable with the interview. However, other neighborhoods in South Baltimore are facing the same issues and it would be important to get their insight as well.

Appendices

Appendix A: Survey Questions

1. Age group: What is your age group?
   a. 18-29 years old
   b. 30-49 years old
   c. 50 - 69 years old
   d. 70+ years old
   e. Prefer not to answer
2. How would you describe your race(s)/ethnicity(ies)? Please select all that apply.
   a. American Indian or Alaska Native
   b. Asian or Asian-American
   c. Black or African American
   d. Hispanic, Latina, Latino or Latinx/e
   e. Native Hawaiian or Other Pacific Islander
   f. White
   g. Another option not listed here (Please specify, feel free to list more than one, if applicable): _____
   h. Prefer not to answer
3. Education Level
   a. Some high school - didn't complete
   b. High school diploma or GED
   c. Some college, but no degree
   d. Associates Degree (for example: AA, AS)
   e. Bachelor's Degree (for example: BA, BBA, and BS)
   f. Postgraduate degree
   g. Prefer not to answer
4. Household size: Please select the number of people that live in your household on a regular basis
5. Which of the following describes your type of home?
   a. Rowhouse/Townhouse/Duplex
   b. Single-family house
   c. Multi-unit apartment /condo building
   d. Student on-campus
   e. Other
   f. Prefer not to answer
6. What best describes your current living situation?
   a. I/we rent
   b. I/we own
   c. Other:
7. How long have you lived in Baltimore City?
8. Location of neighborhood they live in/ Zip Code: Please indicate your neighborhood: name a street intersection and neighborhood

9. How long have you been a resident of this neighborhood?
10. How familiar are you with waste/garbage in your household and how it is removed from your home?
    a. I don't know
    b. I don't handle it but I know what goes on
    c. I am responsible for handling waste and waste management in my household
11. In a typical week, how would you rank the types of waste/garbage your house produces by volume? Please rank (1-5) the following categories from least (1) to most (5) produced.
    a. Plastic
    b. Paper
    c. Food waste
    d. Glass
    e. Metals
    f. Other:
12. Does your household separate waste before it is collected?
    a. Yes
    b. Sometimes
    c. Not often
    d. Never
13. What are some reasons your household does not separate waste?
    a. Lack of information on what can be separated / I do not know enough about what needs to be separated
    b. Lack of services provided to separate waste / There aren't services available for my neighborhood to deal with waste that is separated
    c. Other:
14. What do you separate your household waste into? (check all that apply)
    a. General trash
    b. Recyclables (e.g, Paper, Cardboard, Glass, etc)
    c. Food waste / Compost (e.g food scraps)
    d. Electronics
    e. Other
15. How does your waste get collected?
    a. Curb-side/alleyway
    b. Community accessible dumpster
    c. Empty space near my household
    d. Other (please describe)
16. How often is general trash collected?
    a. Weekly
    b. Every other week
    c. Monthly
    d. Every two months
    e. Don't know
17. On a scale from 1-5, how reliable do you feel your trash collection services are?

a. Very Reliable
b. Reliable
c. Neutral
d. Somewhat reliable
e. Not reliable

18. Do you have recycling collection services where you live?
    a. Yes
    b. No
    c. Don’t know
19. How often is recycling collected?
    a. Weekly
    b. Every other week
    c. Monthly
    d. Every two months
    e. Don't know
20. On a scale from 1-5, how reliable do you feel your recycling services are?
    a. Very Reliable
    b. Reliable
    c. Neutral
    d. Somewhat reliable
    e. Not reliable
21. If you were provided recycling services, how likely would you be to use them?
    a. Very likely
    b. Likely
    c. Neutral / Uncertain
    d. Somewhat likely
    e. Not Likely
22. Do you have compost collection services where you live?
    a. Yes
    b. No
23. What do you do with that food waste?
    a. Compost is collected from my home
    b. I bring it to a composting facility
    c. I compost at my own home
    d. Other: _____
24. What are some things the city can do to better support waste management in your household?
25. Do you know where the general trash collected from your household goes?
    a. Yes
    b. No
    c. Uncertain (please explain)
26. If so, where is your trash going? (Check all that apply) grid (local in Baltimore, in Maryland, out of state)
    a. Local landfill / Dump
    b. Local incinerator

c. Maryland state landfill/Dump
d. Maryland state incinerator
e. Out-of-state incinerator
f. Out-of-state landfill/Dump
g. Other: _____

27. How confident are you in this response?
a. Very Confident
b. Confident
c. Neutral
d. Somewhat confident
e. Not confident

28. When thinking about landfills and their associated impacts, which would you consider the most concerning?
a. Environmental impacts: climate change
b. Health impacts on the workers
c. Increase in garbage pollution
d. Health of communities near them
e. Smells that come from them

29. When thinking about incinerators and their associated impacts, which would you consider the most concerning?
a. Environmental impacts: climate change
b. Health impacts on the workers
c. Increase in garbage pollution
d. Health of communities near them
e. Smells that come from them
f. Other

30. Which of the following sustainable disposal practices do you do at home?
a. Reuse plastic bags
b. Reuse Tupperware
c. Donate clothes to family and friends
d. Donate clothes to stores (salvation army, goodwill etc.)
e. Use a reusable bag when going shopping
f. Compost food scraps
g. Give away food that I don't eat
h. Give away furniture or household goods that I don't use
i. Buy eco-friendly things for my home
j. Other:

31. What are the kinds of waste you notice the most in your neighborhood? (check all that apply)
a. Plastic bottles
b. Glass
c. Plastic bags
d. Food waste
e. Bulk items (e.g., discarded furniture)
f. Cardboard
g. Pet waste & pet waste bags

h. Other:

32. In public areas, what type of public waste collection bins do you see in your neighborhood?

a. General trash
b. Community dumpster
c. Recycling plastic bin
d. Recycling paper bin
e. Composting bin
f. I do not see garbage bins in public spaces

33. On a scale from 1-5 (1: not polluted with garbage, 5:extremely polluted with garbage) how would you rate the amount of trash dumped in your neighborhood?

a. High amount
b. Polluted
c. Neutral
d. Somewhat polluted
e. Not polluted

34. What additional impacts do you associate with this trash in your neighborhood?

a. Increase in pests (e.g, raccoons, rats, insects, etc)
b. Impacts on local waterways
c. Impacts on people's health
d. Visual pollution affects people's perception of the neighborhood
e. Impacts on the Environment

35. Please rank in order of importance, these issues if faced within your community

a. Crime and safety
b. Access to better health services
c. Access to more jobs
d. Better housing
e. Better education systems
f. Reducing trash pollution
g. Reducing water pollution
h. Reducing air pollution

36. On a scale from 1-5, how much support does your community receive from the city in regard to waste?

a. A lot of support
b. Some support
c. No support
d. Uncertain

37. Besides initiatives by the city, are there other efforts in your neighborhood to address waste/garbage issues?

a. Yes
b. No
c. I don’t know

38. What are those? (List as many that you are aware of)
39. Have you heard about Zero Waste before?
    a. Yes
    b. No
40. If yes, where did you learn about it?
    a. Social media
    b. Media
    c. Local organization
    d. Family/friends
    e. From the city government
    f. Other
41. If so, please explain what you know about it
42. If you have not heard about Zero Waste, what do you think it means?
43. Which one of these actions do you consider part of zero waste efforts (check all that apply)
    a. Recycling plastics
    b. Recycling glass
    c. Composting
    d. Reusing plastics
    e. Reusing glassware
    f. Donating clothes to family/friends
    g. Donating clothes to thrift stores
    h. Waste incineration
    i. Sending waste to landfills
    j. Anaerobic digestion

44. What are other things not included above that you consider part of the Zero Waste movement?
45. Where have you seen zero-waste strategies implemented?
    a. In my neighborhood
    b. In other neighborhoods in the city
    c. Citywide
    d. In other parts of Maryland
    e. Out of state
46. Do you participate in Zero Waste initiatives?
    a. Yes
    b. No
46. If yes, can you describe some of the initiatives?
47. If not, can you tell me why?
    a. Don't feel I have access to any
    b. I am not aware of any in my area
    c. I don't know what I can contribute
    d. I don't have the time
    e. Other
48. From what you have experienced with these initiatives, what do you see as the impacts they have had?

Appendix B: Interview Questions

1. Tell me about yourself, your family history, what brought you to Baltimore
2. How long have you lived in Baltimore City? What are things you notice about Baltimore City
3. What neighborhood do you live in? How long have you lived in this neighborhood? How and why did you decide to live here?
4. What do you like the most about living here?
5. What are some positive encounters or interactions you have had in this neighborhood?
6. Just looking down this street or park, what is something that reminds you about what you like about this neighborhood?
7. What is something that is special to you about this neighborhood? Why is this important to you?
8. Is there something you don't like about the neighborhood? If so, how would you imagine changing it?
9. Are there any challenges you, your neighbors, and/or your neighborhood are experiencing right now? What are they?
    a. How do these challenges affect you personally? How do you deal with those challenges?
    b. What needs to change? How does the community advocate or create that change?
10. Looking down the street or this park, is there something that you see that relates to those challenges?
11. What is your opinion on garbage in this neighborhood? Do you see it as an issue of concern in this neighborhood? Why or why not?
12. Now again looking down this street or park, is there anything that makes you think about garbage? What can you tell me that you see or do not see as an issue?
13. What kinds of impacts do you think the garbage in your neighborhood has on the environment and on people's health? (can you tell me more about a specific impact you've noticed? Are there any other factors that might impact health beyond garbage in this community?
14. How is this garbage cleaned up? Who cleans it up?
15. How reliable are the city services involved in the cleanup? If you could imagine more effective services what would that look like?
16. Where do you think this waste ends up after it is picked up?
17. Have you heard of a trash incinerator? What do you imagine it does?
18. Are you aware of the opposition to the incinerator? If so, can you tell me more of what you know about that opposition?
19. Do you see any connection between the trash produced in your neighborhood and the incinerator? If so, what is that?
20. Do you see any connection between the incinerator and its impacts on the environment and people’s health?
21. Do you see these impacts affecting your community? How so?

22. What types of garbage is produced in your household?
23. Do you separate your waste? (e.g, recyclables, compost, etc.) why or why not
    a. If not, are there any ways to make it easier for you to separate waste?
24. Do you know where your garbage goes after you throw it out?
25. Do you think all the waste you produce is trash?
26. Which of the following do you do at home?
    a. Reuse plastic bags
    b. Reuse Tupperware
    c. Donate clothes to family and friends
    d. Donate clothes to stores (salvation army, goodwill, etc.)
    e. Use a reusable bag when going shopping
    f. Compost food scraps
    g. Give away food that I don't eat
    h. Give away furniture or household goods that I don't use
    i. Buy eco friendly
27. Where did you learn some of these practices? How did you get in the habit of doing them? Why do you engage in these practices?
28. Have you ever heard of the term Zero Waste?
    a. What does zero waste mean?
    b. Have you been asked to participate in Zero Waste events?
    c. Do you think there are barriers to zero waste?
29. What do you think are sustainable trash disposal practices? (e.g good for the environment, health, economical)
30. What do you think about our human relationship with land and the environment?
31. Have you ever grown your own food? Have you ever had your own garden? Do you kids have green spaces?
32. If you had to envision your ideal community, what would it consist of?
33. I've asked you everything that I had to ask you today, is there anything you want to ask or add- is there something that I didn't ask you about that you think I should have?

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