# ABSTRACT


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| Title of Thesis: | USING AN INDUCTIVE GROUNDED THEORY APPROACH TO UNDERSTAND HOW SCREENING TOOLS AND CASE STUDIES ASSESS ENVIRONMENTAL INJUSTICE IN COMMUNITIES IN THE UNITED STATES |
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Communities of color and low-income communities in the United States are disproportionately overburdened with environmental hazards and disamenties. Case studies and screening tools are two common methods of assessing these environmental injustices at the community level. There have been comprehensive analyses of both screening tools and case studies, but there has been little comparative work on how screens and case studies capture environmental injustices. Using an inductive grounded theory approach, 24 case studies and eight screens were coded using MAXQDA to identify a total of 38 themes. Race, socioeconomic status, environmental impacts and degradation were the most commonly identified themes in both screens and case studies. By completing a comparative analysis of how environmental injustices are captured by case studies and screening tools, this thesis seeks to highlight potential weaknesses that limit the capability of these methods to effectively assess and reflect the environmental justice concerns held by community members.

# USING AN INDUCTIVE GROUNDED THEORY APPROACH TO UNDERSTAND HOW SCREENING TOOLS AND CASE STUDIES ASSESS ENVIRONMENTAL INJUSTICE IN COMMUNITIES IN THE UNITED STATES

by

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# Chapter 1: Introduction

April 2020 marked 50 years since the first Earth day celebration and polls from the Pew Research Center showed that ten years ago only 52% of Americans believed that protecting the environment should be a top priority for government officials, whereas in 2020 approximately two thirds of Americans believed protecting the environment should be a top priority (Funk & Kennedy, 2020). These statistics highlight the mainstream importance of environmentalism and the long way that U.S society has come from environmentalism being seen as a luxury primarily enjoyed by wealthy white men spending time outdoors (Taylor, 1997). However, despite the increase in interest about the environment and environmental degradation, there has not been equal increase in focus on how low-income communities and communities of color often bear disproportionate environmental burdens and disamenities, while simultaneously experiencing fewer benefits from environmental services such as green space (Bullard & Johnson, 2000; Todd & Zografos, 2005; Sze & London, 2008). These communities are experiencing environmental injustice and the struggle to bring justice to these communities has been continuously occurring for almost as long as the modern environmental movement has been in existence (Harris, 2016).

The United States Environmental Protection Agency (U.S EPA) defines environmental justice as the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA, 2020). Concerns about environmental injustices were first sparked as part of the Civil Rights movement during the 1968 Memphis sanitation workers' strike. The day before Martin Luther King Jr was assassinated, he led a rally in Memphis, Tennessee. The focus of this rally was the unfair treatment of Black sanitation

2workers (Rosa-Aquino, 2019; Whitlinger & Fretwell, 2019). For nearly two months, Black sanitation workers had been protesting for better pay and safer working conditions because they were consistently over exposed to hazards in comparison to their white counterparts. The strike started as a result of two workers, Echol Cole and Robert Walker, being killed when they were crushed by an outdated and malfunctioning trash compactor (Whitlinger & Fretwell, 2019). The deaths of these two men resulted in 1,000 workers walking off the job.

Almost 15 years after the Memphis sanitation workers strike, what many environmental justice scholars consider to be the start of the environmental justice movement occurred in Warren County, North Carolina in 1982. The environmental justice concerns in Warren county had begun in the 1970's when a trucking company illegally dumped 30,000 gallons of polychlorinated biphenyl (PCB) waste oil along more than 200 miles of road throughout the state (Burwell & Cole, 2007). The EPA determined that the waste needed to be removed from the side of the road and placed into a landfill. The state was originally considering more than 100 sites in more than 10 counties. Out of all the potential places, a site identified was in Warren county, which had the highest Black-American population in the entire state.

When the town of Afton in Warren county was initially slated as a possible disposal site for the PCB waste, residents became concerned of the potential decline in property values and increase in health risks. Although the site within the town was originally determined to be unsuitable for a toxic waste site, due to the high water table and loose soil, the EPA granted a waiver for the site to be built anyway. The EPA also gave the state a $2.5 million grant to fund the building and construction of the landfill (Burwell & Cole, 2007).

After the landfill was constructed, protesters organized to block roads leading up to the site to prevent dump trucks from entering. These protests resulted in the arrest of both adults and

children, and also sparked national interest in the events happening within the town (Burwell & Cole, 2007). Within a month of the dumping site being opened, almost 450 people had been arrested and more than 7,000 truckloads of hazardous waste had been brought to the dump. Fifteen years after the landfill was opened, there were already major threats to its structural integrity. Water had started to leak into the landfill and the additional weight placed on the lining of the landfill increased the risk of rupturing. Residents of Warren County began lobbying for the landfill to be detoxified in 1994 and the detoxification was completed in 2004 (Burwell & Cole, 2007).

## Studying Environmental Justice

The events that occurred in Warren county sparked a new field of research on the disproportionate environmental burdens experienced by low-income communities and communities of color. Indeed, the first case study conducted on environmental justice was directly influenced by the injustice seen in Warren County (Burwell & Cole, 2007).

Environmental justice first came to be studied through the use of case studies. One of the first case studies on environmental justice was undertaken by the United States General Accounting Office (GAO) in 1983. This case study examined the relationships between the location of landfills and the socio-economic status and racial demographics in the neighborhoods that surround them (Knorr, 1997). Later, in 1987, the United Church of Christ (UCC) examined the relationship between race and commercial hazardous waste sites (Knorr, 1997). The UCC found that areas without waste facilities had very few residents of color whereas the areas with the highest numbers of waste facilities also had the highest average percentages of residents of

color. Then in 1989, the California Department of Health Services published a case study that found that Black-Americans and low-income residents were more likely to be poisoned by lead as a result of toxic metal sources (Knorr, 1997).

Although case studies were the earliest approach to documenting and studying environmental injustices within communities, other methods such as assessment tools (i.e screen and indices) and personal narratives have increased in use in recent years. Presently, the most frequently used method for analyzing environmental injustices in communities is through the use of a cumulative environmental justice tool. These tools include EJ screens, assessments and indices. These tools attempt to combine indicators that will demonstrate the environmental injustices are faced within communities (U.S EPA, 2019). Screens and assessments can be useful because these tools have the potential ability to address the nuances of local conditions and can explore the relationship between environmental justice and political structure, sustainability and economic growth as well as being able to demonstrate if society has become more equitable (Harner et al., 2002; Todd & Zografos, 2005).

There has been comprehensive analysis of environmental justice tools (Blondell et al., 2020; Kuruppuarachchi et al., 2017) and environmental justice case studies (Ringquist, 2005; Zilney et al., 2006; Bowen 2002). Blondell et al., 2020 reviewed the use of several U.S., state-based environmental justice assessment tools to determine how these screening tools could be developed for the state of Michigan. They describe four state-level environmental justice screens and used semi-structured interviews to gain a deeper understanding of the practical limitations and benefits of using screening tools in policy making. The interview data highlighted that there are varying levels of stakeholder engagement in the creation of environmental justice screens and that the main uses of screening tools include disseminating information, incorporating

environmental justice principles into policy, and promoting advocacy for community members (Blondell et al., 2020). Kuruppuarachchi, Kumar and Franchetti (2017) discuss three common environmental justice screens that vary in scale as one is on the state level, one is on the national level and one is internationally based. Kuruppuarachchi and colleagues provide overviews of the functionality of these screens and address the variety of features that are available within each tool.

For case studies, Ringquist (2005) used a meta-analysis of case studies to investigate if environmental inequities are distributed unequally along the lines of race and class and to discuss why some studies have found inconclusive evidence supporting the existence of race based environmental inequities. In another review, Bowen (2002) assessed empirical research on environmental justice by examining 42 case studies and categorizing these case studies as poor, medium or high quality based on the quality study designs and research methods. Finally, Lisa Zilney, Danielle Mcgurrin, and Sammy Zahran (2006) completed a review of environmental justice case studies to assess which disciplines were the most active in terms of contributing to the peer-reviewed literature on environmental justice.

The above reviews of case studies and environmental justice assessments tend to focus on the scientific rigor and validity of the methods as opposed to critiquing and understanding the context and content captured by the identified environmental justice indicators, particularly at the community level. The existing analyses of screening tools provide general overviews of the functionality of the screen, but there is little to no critique of the indicators that have been selected and the implications for the selection of these indicators. Importantly, while there have been reviews of screening tools and case studies, there has been very little comparative work done to assess how similar or dissimilar both case studies and screens are in terms of capturing

environmental injustices in communities. The need for this comparison is paramount given that both screens and case studies serve as two dominant methods of assessing environmental justice concerns in communities. Comparison allows for a deeper understanding of why there is a need for more than one method of analysis. A comparative analysis also allows for a critique of these methods in terms of the effectiveness of screens and case studies to accurately capture environmental justice concerns in communities. In addition, there has been little comparative analysis of how the indicators and variables reported in community case studies and environmental justice screens are similar or different in their definition and coverage. Understanding what is captured by both case studies and screens is of the utmost importance because if the indicators are not relevant to the community of interest or if the tool selected is fundamentally limited in being able to integrate certain indicators, this could affect the overall usefulness of the case study or the screening tool. Literature reviews tend to focus on one or the other, but rarely compare and discuss their combined coverage and its implications for understanding community environmental injustice.

This thesis seeks to fill the absence of comparative analysis by using a grounded theory inductive approach to identify the content captured by indicators of environmental injustice that are used in both case studies and environmental justice assessments. Interviews were also used to further understand content but particularly context of the assessment and case study research. An analysis of the meaning and context in which the indicators are used in both environmental justice assessments and case studies also provides insights as to why some indicators are more prevalent than others.

In Chapter 2, I provide a brief history of the environmental movement and describe the context in which the environmental justice movement relates to the overall environmental

movement. I also describe how case studies and environmental justice screening tools have become the dominant methods used for assessing environmental justice concerns within communities.

Chapter 3 presents the conceptual framework for grounded theory and inductive approaches. These approaches utilize close reading of multiple data sources and the coding of textual segments develop themes and draw comparisons between data sources. The data sources in this thesis include case studies, screening tools and semi-structured interviews. This chapter also outlines the methodology for selecting case studies and screens, conducting semi-structured interviews and analyzing raw textual data in MAXQDA.

Chapter 4 presents the results of an inductive, grounded analysis. Twenty-four case studies and eight screens were examined and coded in text analysis software, MAXQDA. Thirty-eight themes are identified among all the data sources. The most common themes were race and socioeconomic status. Screening tools and case studies had a similar capacity for addressing the four most common themes (race, reduced health outcomes, socioeconomic status, and environmental impact and degradation). However, the majority of the remaining themes were unevenly distributed.

Finally, in Chapter 5 I discuss the implications for which the themes identified can lead to limitations in how effectively screening tools and case studies can capture environmental injustices. I also describe how the work conducted for this thesis fits within the current bodies of work that have been done on environmental justice and offers unique insights that have not been fully realized by the current research. Potential expansions of this research are also discussed in this chapter.

# Chapter 2: A Historical Approach to Understanding Environmental Justice

The following chapter describes a history of the environmental movement and how the environmental justice movement has filled in the gaps of the environmental movements' lack of concern for communities of color and low-income communities. Understanding the history of the environmental movement helps to position the environmental justice movement within the larger context of emerging social justice movements and increasing concern for the environment. Environmental justice helps to understand the relatedness between coupled human and natural systems. Environmental injustice concerns in communities can be captured using case studies and screening tools. Both of these methodologies offer unique insights and pose challenges to successfully capturing and assessing concerns at the community level.

## History of the environmental movement

Environmental activism has had a long-standing history in the United States, but goals and practices of the environmental movement have changed over time. Dorceta Taylor (1997) has characterized the changes in the environmental movement into four distinct phases and time periods. Taylor refers to the time from 1820 until 1913 as the "pre-movement era." During this time period there was a surge of romanticism about the outdoors and wilderness. Most of the environmental activists during the pre-movement era were white, middle class men who were financially secure. These men tended to use outdoor expeditions as "an antidote to the ills of the urban environment" (Taylor, 1997, p.19). The conditions for the working class were steadily declining as homelessness, industrial accidents, and poor sanitation continued to rise. The pre-

movement area also saw a rise in the amount of greenspace and park areas that were available for the middle and working classes. It was believed that parks served important political and social functions because they provided cheap leisure for laborers (Taylor, 1997).

Following the pre-movement era was the "post-Hetch Hetchy" period which lasted from 1914 until 1959. The post Hetch Hetchy era was mainly marked by increased inclusion into the environmental movement. This area is the first time where the environmental movement began to expand beyond the elite groups of conservationists, preservationists and outdoor enthusiasts. During the post-Hetch Hetchy era there is also increased unionization among people of color in an effort to advocate for higher pay and less exposure to hazardous work sites (Taylor, 1997). The post-Carson era lasted from 1960 until 1979. After Rachel Carson published her book *Silent Spring* there was an enormous surge in environmental advocacy. Pollution and chemical contamination became major priorities among activists, government officials and Non-Governmental Organizations (NGOs). Membership in NGOs such as the Wilderness Society and the Sierra Club increased drastically, but many of these new members were white. For example, "A 1972 study of 1,500 environmental volunteers nationwide showed that 98 percent of the members of the environmental organizations were white and 59 percent held college or graduate degrees. Forty-three percent held professional, scientific-technical, academic or managerial jobs" (Taylor, 1997, p.40). The disasters of Three Mile Island and Love Canal marked the end of this era and the start of a new focus for the environmental movement (Taylor, 1997).

The city of Love Canal, NY was home to the Hooker Plastic and Chemical Company. The Hooker Plastic and Chemical Company used the abandoned canal in the city as dumping ground for their hazardous waste materials. Eventually the company filled in the empty canal with clay and then sold the land to the local school board (Smith, 2007). The school board then

used this land to build an elementary school. Eventually the pervasive odor and increased occurrences of skin rashes and cancer among those who lived closest to the school created public unrest. President Jimmy Carter declared the city to be a disaster area and had the remaining families relocated (Smith, 2007). Although the events that occurred at Love Canal were tragic and sparked nationwide media attention, occurrences similar to those at Love Canal were occurring all over the nation. Taylor refers to the 1980 to present as the post-Love Canal/Three Mile Island era. The during post-Love Canal/Three Mile Island era much of the environmental landscape still continues to be dominated by middle class white men. There has also been a marked shift in the organizational structure of the largest environmental NGOs. Many of these organizations began to take on a hierarchical structure that focused more on lobbying and political policy than grassroots organizing or local matters (Taylor,1997; Bullard & Wright,1987). There have been policies put into place to prevent events such as those at Love Canal from happening. For example, the 1986 Emergency Planning and Community Right-to-Know Act (EPCRA) mandates that polluting industries such as solvent recovery, coal mining and electrical generation must report the amount of designated pollutants that have be released if their operations have exceeded the threshold values (Ash & Fetter, 2004). However, it should be noted that the benefits of these policies and regulations have not been enjoyed equally by all groups living within the U.S (Bullard, 2003; Pinderhughes, 1996).

## History of the EJ movement

The modern-day environmental movement began in the early 1820's but for most of this time environmental issues concerning low-income communities and communities of color were

largely ignored by environmentalists (Taylor, 1997). This began to change in the 1970s when high publicity was brought to the events that occurred in Love Canal, NY (Taylor, 1997). The town of Love Canal was home to the Hooker Plastic and Chemical Company. Between 1942 to 1953 Hooker Plastic and Chemical Company had illegally dumped more than 20,000 tons of toxic waste into an unlined canal (Smith, 2007; Fletcher, 2002). More than 200 chemicals were found in the canal as a result of the dumping and some of the waste products put into the canal included municipal garbage, chlorinated hydrocarbon residues, fly ash and processed sludge (Fletcher, 2002). These toxins then led to a pervasive odor within the community as well as increased cancer rates (Smith, 2007). Although events like those experienced at Love Canal were most likely happening all over the country for years, this was the first time that these concerns had been addressed on a national scale. In 1979 President Jimmy Carter declared the town of Love Canal to be a disaster zone, thus highlighting the national importance of the need to address the issues associated with environmental pollution, environmental justice and community health (Smith, 2007).

A lesser-known connection between environmental justice and community health started during the civil rights movement. During the civil rights movement local protest against lead poisoning in urban neighborhoods, environmental pollutants such as industrial chemicals and inadequate sanitation and municipal service delivery were occurring consistently and were constantly considered to be issues of concern by many civil rights leaders (Pinderhughes, 1996). However, the mainstream environmental movement at the time of the civil rights movement did not consider the environmental concerns of Black-Americans as a priority, so these issues ended up being largely ignored by policy makers, media, and environmentalists (Bullard & Wright, 1987; Bullard, 1993). The events at Love Canal helped to legitimize the ignored concerns of

environmental justice during the civil right movement because they brought national attention to the intersection of social justice and environmental justice. This newfound public awareness about environmental justice fostered a resurgence of concern about many of the environmental justice issues that were being protested during the civil rights movement except these concerns were now being voiced on a national level instead of at the community level (Bullard, 1993).

## Environmental Racism, Environmental Justice and Environmental Equity

The post-Love Canal/Three Mile Island era has also seen an increase in the awareness about environmental justice and environmental racism. The term environmental racism was first coined in a 1987 study conducted by Benjamin Chavis and the United Church of Christ. The term environmental racism has since evolved into terms including "environmental justice" and "environmental equity" (Purvis, 2001; Calloway & Ferguson, 1997). Oftentimes these terms are often used interchangeably, but it should be noted that all three of these terms have distinctly different definitions and although there are similarities between them the terms are indeed not interchangeable. Robert Bullard (2003, p. 50) defines environmental racism as "environmental policy, practice, or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups, or communities based on race or color". Environmental racism is the result of institutional racism and is sometimes considered to be a form of institutional racism (Pinderhughes, 1996; Bullard, 2003). Presently there are two dominating theories about why environmental racism occurs. The first theory emphasizes that communities of color tend to have less power and are poorer than white communities, thus allowing for companies to source environmental hazards in these areas because they offer a path of least resistance. This first

theory also highlights that poorer areas offer cheaper land for operational cost and the people in those communities will be more reliant on the jobs that are brought by polluting industries (Pinderhughes, 1996). The second theory focuses on how segregation and housing patterns have confined communities of color to regions and areas that have already been overburdened with environmental hazards (Pinderhughes, 1996). Although there are two dominant theories more recent works have acknowledged that "more often than not, environmental injustices result from industrial and/or governmental facilities targeting of low-income and people of color communities after residents have moved into a neighborhood" (Pellow & Vazin, 2019, p.4). Environmental racism has been reinforced through governmental, legal and economic institutions. These institutions have used procedural injustices in the processes of public policy and land-use planning (Bullard, 2003; Todd & Zografos, 2005).

According to Calloway and Ferguson (1997, p. 1551) "Environmental Equity refers to the equal protection of environmental laws.... Therefore, laws should be enforced equally to ensure the proper siting, clean-up of hazardous wastes, and the effective regulation of industrial pollution, regardless of the racial and economic composition of the community." However, Holifield (2001) notes that when the EPA utilized the term environmental equity as opposed to environmental justice there was concern among activist who felt as though the term focused too heavily on redistribution of pollutants and not overall reduction of pollutants.

Environmental justice is a concept that advocates for an equitable distribution of environmental risk and benefits regardless of race, socioeconomic status, or culture and can be defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (Todd & Zografos, 2005, p. 484; Bullard &

Johnson, 2000, p. 558). Calloway and Ferguson (1997) highlight that environmental equity is better equipped to handle questions associated with distributing environmental hazards across all communities whereas environmental justice can address the reparations for past discriminatory actions that might have resulted from environmental racism.

The environmental justice movement has sought to bring awareness to the disproportionate environmental hazard exposure experience by communities of color and has legitimized the concerns of marginalized communities because protests before this era were largely ignored by the media, environmentalists and policy makers (Bullard, 1993). Within the United States race and social class are intricately linked to many of the environmental justice issues that are observed within communities throughout the nation, but it should be noted that race has been found to be an independent variable when analyzing the distribution of environmental hazards (Mann, 2011). Key findings within the realm of environmental justice have shown that race is the most important predictor when it comes to siting of a hazardous waste facility (Bullard & Johnson, 2000). Studies have shown that neighborhoods with higher proportions of Black-Americans have higher levels of toxicity-adjusted exposure to air pollution than predominantly white neighborhoods. Black-Americans tend to live in more polluted cities and more polluted neighborhoods within those cities. Even when factors such as education, income and housing value are held constant among racial groups Black-Americans were still exposed to greater pollution (Ash & Fetter, 2004).

Exposure to environmental hazards can happen through various pathways including but not limited to plastic residues, toxins in the air or water, synthetic chemicals and pesticides on food products. These hazards can result in heart disease, miscarriage, respiratory disease, and lowered sperm count (Pinderhughes, 1996). Reviews of empirical literature on the distribution of

environmental hazards have revealed that “minorities and poor people bear the brunt of environmental dangers" (Pinderhughes, 1996, p. 235). The communities of color that house these environmental hazards are often continuously underserved when it comes to remedying the environmental justice issues within the community. For example, the penalties for hazardous waste sites that are located in predominantly White neighborhoods are 500 times higher than the penalties for hazardous waste sites that are located in communities of color. Examination of public policy and practices have shown that clean-up of hazardous waste often favors White neighborhoods instead of communities of color (Pinderhughes, 1996).

## The Use of Case Studies

Environmental justice first came to be studied through the use of case studies. One of the first case studies on environmental justice was performed by the United States General Accounting Office (GAO) in 1983. This case study examines the relationships between the location of landfills and the socio-economic status and racial demographics in the neighborhoods that surround them. In 1987 the United Church of Christ (UCC) examined the relationship between race and commercial hazardous waste sites (Knorr, 1997). The UCC found that areas without waste facilities had low percentages of residents of color whereas the areas with the highest numbers of waste facilities also had the highest average percentages of residents of color. Then in 1989 the California Department of Health Services published a case study that found that Black-Americans and low-income residents were more likely to be poisoned by lead as a result of toxic metal sources (Knorr, 1997).

Most of the case studies that have been done relating to environmental justice have found that there are disproportionate burdens placed on communities of color and low-income communities (Bullard & Johnson, 2000; Pinderhughes, 1996; Mohai et al., 2009). However, there are several studies that have refuted the idea of environmental injustice existing. For example, although the GAO published one of the first case studies on environmental justice in 1995, they refuted results of their initial study and stated that "no definitive conclusions could be made from other demographic studies performed by the EPA, academia, industry, and public interest groups" (Knorr, 1997, p.83). Environmental justice studies have been contested based on claims the scale of which the case study is performed can alter the results. For example, a case study evaluating the percentages of people of color within a census tract might produce different results than if the same analysis was performed using racial demographics collected at the zip code level. This might happen due to the fact that the sample size is smaller when examining populations as census tract, which is the smallest unit for which the U.S census collects data (Mank, 2001). Despite the concerns associated with environmental justice these case studies can be useful for analyzing the environmental justice issues within a community because they compile data on the environmental conditions and socio-demographic within a community and this data can be used for legal actions that are pursued by community members.

Generally, community members have struggled to get justice through the legal system despite having enough evidence that would classify the community as having been negatively impacted by environmental injustice in a case study. The legal precedent that set by supreme court case Washington v. Davis states that in order for a case prove racial discrimination and unequal protection there must be discriminatory intent (Knorr, 1997). Communities that are impacted by environmental injustice tend to be communities of color and are overburdened, thus

not being equally protected from environmental hazards when being compared to other communities. Unless there is sufficient evidence to prove there has been blatant racial discrimination it is almost impossible for communities to use the equal protection clause in court cases (Knorr, 1997).

## Environmental Justice Tools

The dominant method for analyzing environmental justice is through the use of a cumulative environmental justice tool. These tools include EJ screens, assessments and indices. These tools attempt to combine indicators that will demonstrate the environmental injustices are faced within communities (U.S EPA, 2019). In the following sections I will begin by briefly analyzing this history of why cumulative tools have become prominent in use. I will then describe several of the most commonly used EJ tools and I will also describe several other tools that work on scale smaller than the national level to highlight the diversity and expansiveness of the currently available EJ tools. Finally, I will provide a critique for the areas that are currently being under addressed by the tools that have been created and are available for public use.

A common feature among all cumulative tools is the use of multiple indicators. The combination of indicators in these tools is essential because environmental justice is complex and one single indicator is not enough to fully answer the questions associated with environmental justice (Krieg & Faber, 2004). Environmental justice indicators can be defined as "essentially data that emphasize particular aspects of environmental or communal conditions and trends that could differentially impact environment-health relationships" (Huang & Barzyk, 2016, p. 2). These indicators can be used to assess vulnerability and susceptibility and are often

seen as quantifiable measures of environmental justice (Huang & Barzyk, 2016; Todd & Zografos, 2005). Race and poverty are two examples of commonly used indicators of environmental justice, but the use of indicators alone does not offer a full picture of the underlying reasons as to why some populations are over exposed and or at greater risk (Huang & Barzyk, 2016). Indices are tools that can be used to examine the relationships between environmental justice and the topics of community, political culture and economy (Harner et al., 2002). Cumulative Risk Assessments (CRA) also attempt to quantify the combined risk that stressors or agents apply to human health and the environment (Callahan & Sexton, 2007).

The U.S Food and Drug Administration and the Environmental Protection Agency (EPA) were some of the first government agencies to practice the use of systematic methods of analyzing human health risk from environmental hazards. This practice began to spread to other agencies in 1980 after a supreme court decision that struck down the Occupational Safety and Health Administration (OSHA) standard for benzene because it did not take potential human health risk into account (Callahan & Sexton, 2007). Since this time, the use of qualitative tools has been the dominant method of expressing environmental risk (Callahan and Sexton 2007, 799). The CalEnviroScreen and EJScreen are two examples of quantitative tools that can be used to examine the cumulative impacts of environmental issues (Huang & Barzyk, 2016).

Cumulative EJ tools can be useful because they can show if society is becoming more equitable and can ensure that local stakeholders are participants in the planning processes that impact their areas (Todd & Zografos, 2005). Environmental indicators are often used as a proxy to estimate pollution levels or potential exposure. For example, in the CalEnviroScreen 3.0 the indicator of ozone was used as a proxy for air quality. The presence of atmospheric ozone even at low concentrations can cause an exacerbation of chronic illnesses and lung irritation

(CalEnviroScreen 3.0, 2017). Demographic data can be used to show how susceptible a population is a risk. Environmental indicators and demographic indicators can be used in combination or separately (U.S EPA, 2019). Age is often used as a demographic indicator. Age is an indicator of susceptibility because oftentimes individuals over the age of 65 and children are considered to be sensitive populations and these populations are more likely to experience the negative health impacts associated with environmental injustice within their communities (Morello-Frosch et al., 2011). There are five criteria that should be used when determining what would be a valid indicator. Good indicators should cover the functioning of the system as a whole, relate to clear policy objectives, be understandable to non-scientist, calculated using sound procedures, and be based on parameters that are stable overtime (Todd & Zografos, 2005).

Two very successful environmental justice screens in the United States are the CalEnviroScreen 3.0 and the U.S. Environmental Protection Agency (EPA) EJScreen. The CalEnviroScreen 3.0 focuses on identifying stressors that negatively impact the ways in which California residents experience pollution burdens and vulnerability. CalEnviroScreen uses two broad categories of pollution burden and population characteristics. These categories are then further divided into two components. The components that constitute pollution burden include exposures and environmental effect whereas the components for population characteristics are sensitive populations and socioeconomic factors (CalEnviroScreen 3.0, 2017). Within each of these components indicators were selected. The seven indicators for exposures are “Ozone concentrations in air, PM 2.5 concentrations in air, Diesel particulate matter emissions. Drinking water contaminants, Use of certain high-hazard, high volatility pesticides, Toxic releases from facilities, and Traffic density” (CalEnviroScreen 3.0, 2017). The indicators for sensitive populations are “Asthma emergency department visits, Cardiovascular disease (emergency

department visits for heart attacks) and Low birth-weight infants" (CalEnviroScreen 3.0 2017, p. 11). Socioeconomic factors are “Educational attainment, Housing burdened low-income households, Linguistic isolation, Poverty and Unemployment” (CalEnviroScreen 3.0 2017, p. 12). Indicators of environmental effects were determined to be impaired water bodies, toxic cleanup sites, groundwater threats from leaking underground storage sites and cleanups, solid waste sites and facilities and hazardous waste facilities and generators (CalEnviroScreen 3.0, 2017).

The structure of the EJScreen varies widely from the structure of the CalEnviroScreen 3.0. The EPA EJScreen is a nationwide tool that utilizes 11 environmental indicators and six demographic indicators to address “policy questions and stakeholder concerns in an informative manner” (U.S EPA, 2019). The environmental indicators that are used include ozone level in air, traffic proximity and volume, proximity to waste and hazardous chemical facilities or sites, wastewater discharge, Proximity to National Priorities List (NPL) sites, National-Scale Air Toxics Assessment (NATA) air toxics cancer risk, Particulate matter, NATA respiratory hazard index, NATA diesel PM, and Proximity to Risk Management Plan (RMP) sites. The EJScreen also uses demographic factors of low income, minority, less than high school education, individuals under age 5, individuals over age 64 and linguistic isolation as proxies for potential susceptibility (U.S EPA, 2019).

The creation of cumulative tools for nationwide scale is not unique to the United States. For example, Helen Todd and Christos Zografos (2005) created an environmental indicator that could be used for the entire country of Scotland. Within this study they examined both the procedural and distributive justice associated with EJ in Scotland. The indicators that contribute to procedural justice were determined to be local control over industrial practices, presence of a

local environmental group, consultation on local developments, power sharing at public meetings, and access to information and responsiveness of public bodies. Public green space, private green space, air quality, noise pollution, water pollution, land pollution, and visual pollution were identified to be indicators of distributional justice (Todd & Zografos, 2005). The indicators were then weighted according to interviews that were conducted with seven community environmental activists and 14 experts from government agencies, housing associations and academia. The Analytical Hierarchy Process (AHP) provided the guidance for how to do the weighting. According to the results of this study local control over industry practices was weighted the highest for procedural justice whereas air quality was weighted the highest for distributive justice.

A Community Cumulative Exposure Assessment (CCEA) is another type of cumulative EJ tool. This method is different from the screens and indicators because these assessments shift the focus from an "expert-only" model of analysis to one where local knowledge can be integrated as key data for the assessment and the policy making that might occur as a result of the analysis being completed (Corburn, 2002). Krieg and Faber (2004) created a cumulative exposure assessment for Massachusetts in which they identified 17 indicators of ecological hazards (DEP hazardous waste site (general) ; DEP hazardous waste site (Tier I – II); EPA-NPL (Superfund) waste site; Large power plant—top five polluter; Small power plant; Proposed power plant; TURA industrial facility; Municipal incinerator; Resource recovery facility; Incinerator ash landfill; Demolition landfill; Illegal site; Sludge landfill; Tire pile; Municipal solid waste landfill and Trash transfer station) that were then weighted by a panel of experts to reflect the impact that the indicators had on the community. The indicators that were the most harmful were weighted higher to reflect their severity. For example, large power plants and

superfund sites had point scores of 25 whereas a demolition landfill only had a point score of 3. These weighted indicators were then used across geographic and social distribution analysis (Krieg & Faber, 2004).

Huang and London (2012) also sought to do a cumulative assessment for the San Joaquin Valley region of California. In their study they completed a Cumulative Environmental Vulnerability Assessment (CEVA) that was composed of a Cumulative Environmental Hazard Index (CEHI) and a Social Vulnerability Index (SVI), with an additional Health Index (HI) (Huang & London, 2012). The CEHI gave block groups a score between 0 and 1 the higher the score the greater the number of environmental hazards that were contained within the block group. The environmental indicators used for the CEHI include "toxic release inventory sites, refineries, hazardous treatment, storage and disposal facilities (TSDs), chrome platters, pesticide application, and the national-scale air toxic assessment (NATA)" (Huang & London, 2012, p. 1597). According to Huang and London (2012) the "SVI was developed to describe the sensitivity of the community to health challenges and resources to mitigate negative health impacts from environmental hazards" and similarly to the CEHI the SIV uses a scale of 0-1. On the SIV scale the higher the number the more vulnerable a block group will be to hazards (p.1599). The indicators used in the SIV include age, location of healthcare facilities, race, education, poverty, and linguistic isolation. The added health index used indicators of years of potential life lost before age 65, low birth weight and asthma hospitalization rates for ages 0-19 (Huang & London, 2012).

# Chapter 3: Conceptual and Methodological Approaches

An inductive, grounded theory framework was used in this thesis research. (Thomas, 2006; Backman & Kyngäs, 1999). Inductive approaches include detailed readings of raw data to derive themes, concepts and models (Thomas, 2006). Moreover, an "inductive approach is a systematic procedure for analyzing qualitative data in which the analysis is likely to be guided by specific evaluation objectives" (Thomas, 2006, p. 238). The use of multiple sources of data is a common practice in qualitative inductive research and these data sources can include technical reports, case studies, and journal articles. Qualitative research also includes the use of interviews (Gioia et al., 2013). Grounded theory is a flexible qualitative approach that can be used to generate theories inductively based on available data when there is little known about a topic. Grounded theory requires the use of purposefully selected data sources including interviews, letters, government reports and grey literature. These data sources are then constantly compared and contrasted to generate abstract theories and concepts (Tie et al., 2019). The comparative analysis of data sources in a grounded theory approach also allows for consistencies and differences in the source material to be assessed. Coding is an integral part of both grounded theory and inductive approaches. In grounded theory an initial coding of raw textual data is completed to identify groups of words that signify psychological and social processes, whereas in an inductive analysis the codes are generated to create themes (Tie et al., 2019). One critique of inductive approaches and grounded theory is they do not adequately justify their assertions and the evidence provided for the claims could be described as "thin" (Gioia et al., 2013). This thesis addresses this critique by using a detailed literature review to further justify the context and relevance of the indicators that have been identified by using inductive reasoning. The close reading of multiple sources of raw textual data followed by coding of textual segments used in

this thesis follows the methods acceptable for both inductive and grounded theory approaches. The codes that were generated from coding were used to identify themes and not generate theories, thus making the resulting information presented in the following chapters more reflective of inductive reasoning than grounded theory.

## Data Sample

The sample of data for this thesis include published, text materials and interviews. The text data for this thesis was generated through online searches of existing databases using key terms. Additionally, this thesis uses stringent requirements for the selection of data sources (i.e limiting the search terms and databases that were used, limiting the geographical area, and setting guidelines for case study and assessment tools selection) to increase the replicability of the study and to strengthen the overall validity of the claims that have been made.

### *Selection of Environmental Justice Screening Tools*

Publicized environmental justice assessment tools were initially identified through a literature review to provide background information on environmental injustice. The "ancestry" approach was used, which is referring to the reference section of published works and then using cited works to build your own literature review. The ancestry method was used to follow up with EJ assessment tools that had been mentioned in articles that were used to develop the literature review for this thesis (Ringquist, 2005). Both EPA EJSCREEN and CalEnvrioScreen were identified using this method. Eight additional environmental justice assessment tools were selected by combining the search terms "environmental justice" and "environmental racism" with the "assessment" "tool" and "screen" in google scholar, JSTOR, WorldCat, ScienceDirect, Sage Journals, ProQuest, and Web of Science (Table 1).

Table 1: Sampling frame for screens

| Screen Name | Location |
|---|---|
| CalEnvironScreen 3.0 | California, USA |
| Cumulative Environmental Hazard Inequality Index | Los Angeles, California |
| EJSCREEN | USA |
| Cumulative Environmental Vulnerability Assessment | San Joaquin Valley region of California |
| Cumulative Environmental Justice Impact Assessment | Massachusetts, USA |
| Environmental Justice Average Daily Dose approach | USA |
| MD EJSCREEN | Maryland, USA |
| Urban Environmental Justice Indices | Multiple Cities in Colorado |

### *Selection of Case Studies*

Online databases were used to identify environmental justice case studies. These databases are Google Scholar, JSTOR, WorldCat, ScienceDirect, Sage Journals, ProQuest, and Web of Science. The following criteria were used to select case studies: if it used the terms "environmental justice" or "environmental racism" along with the phrase "case study" in the title or keywords section of the paper. If this criteria was not met then case studies could still be considered if they met all three of the following requirements: (1) the focus of the case study was has to be within the continental United States, (2) the research identified the case study identifies the unique environmental justice concerns that are of interest to the affected community, specific to the community of interest and (3) the research documented the impact of environmental justice factors on community members.

The United States was chosen as the region of study, in part to make the thesis research manageable. Additionally, the selection of the United States allows for robust conversations as many different communities spread across the country face environmental injustice concerns so there is a vast amount of source material available focused solely on the concerns of environmental justice communities in the U.S. Within the region of study case studies were required to focus on a single geographic region, city, or state in the U.S, which produced more in-depth, specific analysis of the content and context of the environmental indicators and helped to move beyond general-level information. By only focusing on a single community or region, the case studies are more detailed and specific in their discussion of the indicators of environmental injustice and the direct impacts on community social and economic life.

A total of 10 case studies were selected based on their self-identification as a case study of environmental injustice or environmental racism (Table 2). Each case study was read and coded individually in MAXQDA to identify major themes that were contributing to environmental injustices in the community of interest. To determine themes any variable that was mentioned or referenced as contributing to or exasperating the environmental injustices or environmental racism in the community of interest was recorded. These themes were then combined and organized into a typology (Table 4). Each theme was defined based on how the theme was commonly addressed in the selected case studies and understood in the larger context of environmental justice literature. The typology was organized so that each theme was listed as a category upon which each case study would be evaluated to see if that theme had occurred. If the theme was present, it was noted as “yes” and then a brief excerpt from the journal was included to highlight the exact language of how that theme had been referenced in the text. In total there were 16 themes that were identified after initial review of the 10 case studies.

After the initial typology was created fourteen additional case studies were added to the sample. The additional case studies did not have to have the terms “case study”, “environmental justice” or “environmental racism” in the key words or in the title, but in order for research studies to be classified as a case study of environmental injustice they had to meet all three of the previously mentioned criteria. To find case studies that meet these criteria a variety of search terms were entered into the same search engines utilized to identify the initial ten case studies. Preference was given to case studies that were conducted in communities outside of those that were examined in the first set of ten case studies to expand the range of geographical areas that were covered in the sampling frame for this thesis. The preference for locations were not selected in the in the initial review of case studies that self-identified as case studies could have severely limited the overall sample size as it is common for more than one case study to be conducted in the same region. These case studies were then read thoroughly and examined for the presence or absence of the 16 major themes were identified from the first 10 case studies, while simultaneously identifying emerging themes. The data collected from the second set of case studies was then added to the typology.

Table 2: The sampling frame for case studies

| Case Study | Location |
|---|---|
| Park & Pellow, 2004 | Silicon Valley, CA |
| Bell & Braun, 2010 | Central Appalachia |
| Avni & Fischler, 2020 | Washington D.C |
| Abel, 2008 | Metropolitan St. Louis, MO |
| Boone et al., 2009 | Baltimore, MD |
| Jacques et al., 2012 | Western Michigan |
| Butler et al., 2016 | Flint, Michigan |
| Campbell et al., 2016 | Flint, Michigan |

| | |
|---|---|
| Bolin et al., 2005 | South Phoenix, Arizona |
| Montgomery & Chakraborty, 2015 | Miami, Florida |
| Blackford, 2004 | Kahoʻolawe, Hawaii |
| Yandle & Burton, 1996 | Metropolitan Texas |
| Hines, 2001 | Convent, Louisiana |
| Naidu et al., 2013 | Ohio |
| Whitehead et al., 2008 | Mississippi |
| Johnson et al., 2008 | Dickson, Tennessee |
| Burgess et al., 2013 | Anniston, Alabama |
| Wilson et al., 2012 | Charleston, South Carolina |
| Bang et al., 2011 | Moncure, North Carolina |
| Gray et al., 2013 | Georgia |
| Ishiyama, 2003 | Tooele County, Utah |
| Porter & Tarrant, 2001 | Southern Appalachia |
| Loh & Sugerman-Brozan, 2002 | Roxbury, Massachusetts |
| Jacobson et al., 2005 | New York City, New York |

### *Interviews*

Semi-structured interviews were conducted to add insight to environmental justice screens and case studies. A total of 11 interviews were conducted with environmental justice researchers, governmental officials and non-governmental organization members. Community members, NGO representatives, government officials and researchers are all invested in the outcomes in communities that experience environmental injustice. Case studies and environmental assessment tools are created to reflect and assess the injustices that are experienced within a given community. Researchers, NGO representatives and government officials are often the creators and principal users of EJ tools and case studies, so including feedback from these groups would be essential for capturing concerns and praise about the

accuracy and precision of environmental justice tools that might not be reelected in the final versions of the published tools. Additionally, these stakeholders can provide insight as to why certain indicators are included or missing from published EJ tools. Community members were interviewed to provide insight about the concerns that are perceived as contributing to environmental injustices within their community and to assess how accurately EJ case studies and assessment capture their experiences.

One interview was conducted with a member of an impacted environmental justice community. Researchers were identified by contacting the first authors on articles written about environmental justice that were utilized in the background section of this thesis. A total of nine researchers were identified and then google searches provided links to websites to their institutions where their email addresses were publicly available. All nine researchers were contacted by email and four were interviewed. A google search for environmental justice organizations provided a list of non-governmental organizations that specifically address environmental injustices in communities as part of their mission statement or as one of their initiatives. Emails for representatives of these NGOs were obtained from information that was publicly available on the NGOs respective websites. A total of ten EJ NGOs were identified and a total of 11 individuals across these organizations were contacted. Three NGO representatives were interviewed. Governmental officials were identified by searching for federal and state level agencies and offices with specific aims to address environmental justice concerns in communities. A total of nine governmental agencies and offices were identified. Ten governmental representatives were contacted by email using information provided on the agency websites. Three interviews were conducted with governmental representatives. Each interview lasted approximately 60 -75 minutes and interviewees were asked a series of semi-structured

questions that were approved by the University of Maryland's Institutional Review Board (IRB) . During the interviews participants were asked a series of questions about their personal or professional experiences relating to environmental injustice in communities. Snowball sampling was used to identify individuals who have lived in communities that are burdened with environmental injustices. Three EJ community members were contacted, and one was interviewed.

## Coding in MAXQDA

PDF versions of the selected case studies and technical reports for environmental justice screens were uploaded into MAXQDA 2020. Each document was read through closely during the initial selection process and then these documents were reread in MAXQDA. During the close textual analysis of the documents MAXQDA codes were created based on emergent themes present in the literature. Any variable that was mentioned as contributing to the environmental justice concerns within the community of interest was assigned a one-to-three-word code that broadly described the variable. Each time a new code was created that code was defined, so that if the theme reemerged in the same document or in another document it could be coded for (Table 3). When screens were coded for in MAXQDA only the indicators that were included in the final version of the tool were coded. Codes that were too complex for broad categorization were further broken down into subcategories or subcodes, so that details would not be lost and prevent a false over representation of a code because of it all encompassing nature.

Table 3: Theme definitions

| Themes | Description |
|---|---|
| Government and Governmental Agencies | Addressing specific governmental agencies or governmental officials that contributed to environmental injustice, had the capacity to address the environmental injustices or played a role in remediation efforts. |
| Government and Governmental Agencies → U.S Military | Addressing how the U.S military has impacted EJ concerns in communities |
| Risk Perception | Address how community members perceive the risk they are exposed to regardless of whether or not the perceived risk and actual risk exposure are aligned. Also includes general comments about the community members perception of land uses including physical hazards |
| Incarceration | Mentions the U.S carceral system when discussing environmental concerns within the community of interest or when discussing environmental justice as a concept |
| Food Security | Mentions topics of food insecurity, food deserts, food apartheid, food injustice, food availability or food quality community of interest or when discussing environmental justice as a concept |
| Reparations and Justice | Includes discussion of how remediation or reparation efforts for the community of interest have been approached regardless of if these efforts are successful or unsuccessful. Includes conversations about various other forms of justice including procedural and distributive |
| Law and Policy | Mentions relevant state, federal or local policies that have exasperated environmental injustice or can be used as a tool to provide reparation to community members |
| Land Use →Green Space | Mentions how green spaces (parks, playgrounds, lake etc) are relevant to environmental injustice within a given community |
| Land Use →Housing | Mentions how housing units have been impacted by environmental injustice or how housing units serve as places where environmental injustice is experienced |
| Land Use → Infrastructure | Mentions how public infrastructure (pipes, roadways, etc.) have contributed to environmental justice concerns within the community of interest |
| Land Use →Gentrification | Mentions how environmental remediation of previous environmental burdens has resulted in the displacement of the community that experienced the injustice and now the benefits of the remediation are no longer being experienced by the original community |

| | |
|---|---|
| Land Use → Redevelopment | Addresses a specific redevelopment project in the community of interest |
| Land Use → Accessibility | Addresses who has access to environmental benefits or environmental burdens |
| Land Use → Physical Hazards | Mentions specific facilities or entities that pose an environmental risk or human health to the surrounding community |
| Land Use → Animal Agriculture | Mentions CAFOs or AFO as the specific type of environmental hazard in the community |
| Race | Discusses the racial demographics of the community of interest |
| Age | Addresses how various age groups are impacted by environmental concerns |
| Economic Impact | Addresses how the local economy has benefited or been burdened by environmental injustices |
| Employment and Labor | Addresses how local jobs and employment opportunities have benefited or been burdened by environmental injustices |
| Environmental Degradation | Specifically mentions how natural resources, plants and non-human animals have been impacted as a result of anthropogenic activities within the community. Includes any reference to pollution in general |
| Socio-Economic Status | Mentions the socio-economic status of community members |
| Residency Time | Addresses how long community members have lived in the area |
| Natural Disasters | Mentions how natural disasters (floods, hurricanes, tornados, etc) have created environmental injustices or have exasperated pre-existing injustices |
| Reduced Health Outcomes | Addresses how human health has been negatively impacted by environmental injustice |
| Reduced Health Outcomes→ Occupational exposure | Addresses how human health has been negatively impacted by environmental injustice as a result of occupational exposure to environmental burdens |
| Leadership and Activism | Mentions how community members have been involved in advocacy efforts. Also includes references to how community members were involved in the research process |

| | |
|---|---|
| Educational Attainment | Addresses the educational attainment levels of community members |
| Local Identity | Addresses how community members engage with each other and identity as a cohesive unit. Includes how local culture is referenced when engaging with environmental burdens or benefits |
| Gender → womanhood | Mentions gendered impacts that are specific to "women" |
| Gender → Motherhood | Mentions gendered impacts that are specific to "women" who are mothers |
| Gender → Masculinity | Mentions gendered impacts that are specific to "men" |
| Gender | Mentions gendered impacts without specifying which gender(s) |
| Immigration | Addresses how environmental justice concerns impact immigrants in the U.S |
| Power | Addresses community power dynamics |
| Linguistic Isolation | Households where all members aged 14 and up have difficulty speaking English |

## Data Analysis

I used qualitative, text analysis approaches to analyze the published and interview data. Thomas (2006) outlines methodology that can be used for the coding of the raw textual for inductive approaches. The initial coding process begins with close readings of the raw textual data (in this case environmental justice case studies and environmental justice assessment tools). After the close reading an evaluator will identify and define categories or themes using marked text segments in a qualitative analysis software. The categories are then refined and can be

presented in a typology format (Thomas 2006; Backman & Kyngäs, 1999). This methodology was followed closely for this thesis.

To analyze the data, I examined the five indicators (Race, Socioeconomic Status, Environmental Degradation & Impacts, Land Use →Physical Hazards, and Reduced Health Outcomes) that were the most commonly referenced in both case studies and screens were selected. Selecting to analyze the top indicators is consistent with methods of analysis for inductive approaches used elsewhere (Thomas, 2006). These indicators were further analyzed by examining the text from the coded MAXQDA 2020 to see the context and level of detail in which the indicator was identified. This analysis will be useful for developing a deeper understanding of the challenges and benefits of addressing a single environmental justice using a variety of different metrics. Additionally, the interviews conducted highlighted valuable indicators of environmental justice that were either missed entirely by all the case studies and screens used in this thesis or were among the least frequently mentioned. Analyzing these underserved indicators of environmental justice will be of the utmost importance as these indicators might represent some of the most vulnerable populations in communities experiencing environmental justice concerns.

# Chapter 4: Results

The following section addresses the results from qualitative and quantitative analysis of coded textual segments. A total of 38 themes were identified and the most common themes in case studies and screens combined were race, socioeconomic status, environmental impacts and degradation, land use-physical hazard, and reduced health outcomes. Case studies addressed nearly 95% of all identified themes, but the distribution of themes in case studies is uneven. About 40% of all identified themes appeared in fewer than five of the 24 case studies analyzed. Screening tools addressed only 34% of all identified themes, thus indicating that screening tools have a reduced capacity to address wide ranges of themes. However, when the textual segments of themes that are common in both case studies and screening tools are analyzed, screening tools tend to be more consistent with the level of detail that is used whereas case studies vary widely in the scope and detail of which themes are addressed.

## Overall Pattern of Themes

A total of 38 environmental justice themes were identified in the analysis using MAXQDA. These themes are listed below in Table 4. This includes 24 major themes. Land use was further broken down into eight sub themes (physical hazards, accessibility, housing, redevelopment, infrastructure, green space, animal agriculture, and gentrification). Gender was broken into three sub themes (womanhood, masculinity, and motherhood). Reduced health outcomes had one sub theme (occupational exposure) and government and governmental agencies had one sub theme (U.S military). Thirteen of the 38 themes were found in screens

whereas 36 themes were used in case studies, thus highlighting that case studies are capturing a wider variety of environmental injustice indicators (Table 4).

The MAXQDA analysis also includes information on how many case studies and screens address a given theme and the themes frequency of occurrence. The presence of a theme signifies that the theme has some relationship to the environmental injustices experienced in a community, while information on the number of times a theme occurs in a document suggests a level of importance or significance. For example, if a theme was mentioned only once then it is recorded as present in the case study or screen. However, if a theme is only coded for one time this might be an indicator that this theme is not considered to have a great impact on environmental injustice. There are multiple themes that contribute to the environmental injustices in a community, but not all of these themes will have an equal impact on a community. By examining the frequency of which the themes are mentioned there is an opportunity to understand which themes are the most impactful. Themes that are consistently and frequently mentioned suggest that they are some of the most significant environmental injustice concerns and impacts. The 38 identified themes were coded for 2,345 times using MAXQDA. Race accounted for 14.5% of all coded text segments followed by environmental impacts and degradation (8%), land use - physical hazard (8%), socioeconomic status (7%), and leadership and activism (5%). The five most frequently coded themes account for 42.5% of all coded text segments (Table 4) Importantly, these five themes represent almost half of the more than 2,000 coded segments. Thirteen percent of all identified themes account for 42.5% of all the coded text segments. Four out of the five most commonly coded themes were also in the top five most prevalent in case studies and screens. These findings show the importance of understanding how race, environmental impacts and degradation, physical hazards and socioeconomic status contribute to

environmental injustices. If these are the most common and frequently discussed themes in both environmental justice case studies and screening tools, understanding how case studies and screens cover and report on these themes provides insight into the strengths and limitations of both approaches.

Table 4: Distribution of Themes in Screens and Case Studies

| Theme | Case Study Presence | Screen Presence | Screen + Case Study Presence | MAXQDA Frequency |
|---|---|---|---|---|
| Race | 24 | 7 | 31 | 341 |
| Socioeconomic Status | 22 | 8 | 30 | 162 |
| Environmental Impacts and Degradation | 22 | 6 | 28 | 198 |
| Land Use - Physical Hazard | 19 | 6 | 25 | 190 |
| Reduced Health Outcomes | 19 | 4 | 23 | 115 |
| Law and Policy | 19 | 0 | 19 | 112 |
| Government and Governmental Agencies | 16 | 0 | 16 | 119 |
| Leadership & Activism | 18 | 0 | 18 | 123 |
| Law and Policy | 19 | 0 | 19 | 112 |
| Labor and Employment | 17 | 2 | 19 | 70 |
| Economic Impact | 17 | 0 | 17 | 79 |
| Reparations and Justice | 16 | 0 | 16 | 79 |
| Age | 10 | 3 | 13 | 76 |
| Power | 14 | 1 | 15 | 74 |
| Risk Perception | 13 | 0 | 13 | 69 |
| Educational Attainment | 12 | 4 | 16 | 43 |
| Land Use → Housing | 11 | 3 | 14 | 57 |
| Land Use → infrastructure | 6 | 2 | 8 | 55 |
| Linguistic Isolation | 0 | 4 | 4 | 11 |
| Land Use | 9 | 0 | 9 | 51 |

| | | | | |
|---|---|---|---|---|
| Land Use → Green Space | 6 | 0 | 6 | 55 |
| Local Identity | 9 | 0 | 9 | 32 |
| Educational Attainment | 12 | 4 | 16 | 43 |
| Food Security | 7 | 0 | 7 | 10 |
| Land Use → infrastructure | 6 | 2 | 8 | 55 |
| Immigration | 3 | 0 | 3 | 10 |
| Natural Disasters | 4 | 0 | 4 | 28 |
| Gender → Womanhood | 4 | 0 | 4 | 20 |
| Land Use → Animal Agriculture | 4 | 0 | 4 | 20 |
| Government and Governmental Agencies → U.S Military | 4 | 0 | 4 | 25 |
| Land Use → Redevelopment | 4 | 0 | 4 | 19 |
| Reduced Health Outcomes →Occupational Exposure | 4 | 0 | 4 | 10 |
| Land Use → Accessibility | 3 | 0 | 3 | 20 |
| Residency Time | 4 | 0 | 4 | 9 |
| Gender | 3 | 0 | 3 | 7 |
| Gender → Motherhood | 3 | 0 | 3 | 17 |
| Gender → Masculinity | 2 | 0 | 2 | 11 |
| Land Use → Accessibility | 3 | 0 | 3 | 20 |
| Incarceration | 2 | 0 | 2 | 3 |
| Land Use → Gentrification | 1 | 0 | 1 | 8 |
| Access to Health Care | 0 | 1 | 1 | 1 |

The following examples provide additional insights as to why the frequency of coding can offer additional evidence that analysis of the theme presence or absence cannot. For example, themes of environmental impacts degradation, reduced health outcomes, and law and

policy were all mentioned in 19 out 24 case studies, which might initially cause one to assume that these themes are of equal importance and that is why they have been mentioned in so many of the case studies. However, the theme of land use-physical hazard was identified 190 times, law and policy was identified 112 times and reduced health outcomes were identified 115 times. Although these themes are mentioned in the same number of case studies. The MAXQDA frequencies highlight that these themes are not all discussed in the same level of detail and the qualitative analysis below provides insight to the content of these coded textual segments.

Additionally, socioeconomic status was the second most common theme identified in case studies and screening tools, but the MAXQDA frequency for socioeconomic status is only 162. In terms of frequency socioeconomic status ranks lower than both environmental impacts and degradation, and physical hazards even though both of themes are less prevalent in case studies and screens. This might mean that although socioeconomic status is important to address in screens and case studies it requires less detail and explanation than other less common themes. The frequency variations might also mean that socioeconomic status plays a less significant role in understanding environmental injustices than physical hazards and environmental impacts and degradation.

Although case studies used more themes than screens, these themes are unevenly distributed. For example, 60% of the identified themes appeared in less than half of the case studies analyzed, thus highlighting that the majority of the themes are rarely mentioned or utilized by case studies. This finding suggests that while the capacity exists for case studies to be able to utilize a wide variety of environmental justice indicators when describing communities of interest, this potential often goes unrealized. This is important to note because case studies and screens often share a similar capacity to address common themes of race, socioeconomic status,

environmental impacts and degradation, land use-physical hazards and reduced health outcomes as these themes are in the top five most commonly referenced within each method, although the ranking of these themes differs. However, there is a drastic decline in the capacity that both screens and case studies have to address less common themes. The least frequently mentioned themes in screening tools were power (1) and access to health care (1), but power was addressed in 14 case studies and none of the case studies addressed access to health. Even indicators that appeared in more than two-thirds of the case studies (i.e., reparations and justice, government and governmental agencies, economic impact, leadership & activism, and law and policy) were not addressed by screening tools. These themes are either less important to understanding environmental injustice, or they are being overlooked by screening tools. Later in this chapter four less prevalent themes (homelessness, environmental reparations, linguistic isolation and incarceration) will be further explored to assess their significance in understanding environmental injustices for vulnerable and underserved communities.

The top two themes (race and socioeconomic status) were the same for both screens and case studies. Race was mentioned in all of the case studies and in seven of the eight screens (Table 4). All of the screens mentioned socioeconomic status, but this theme appeared in only 22 case studies. That case studies and screens have the same most commonly referenced indicators of environmental injustice suggests that race and socioeconomic status are key environmental injustice concerns in communities. This finding is not surprising given that several studies have found race to be one of the greatest factors contributing to environmental injustices in communities even after variables such as socioeconomic status are held constant (Ash & Fetter, 2004). This finding is especially important given that screens utilized significantly fewer indicators. Although screens do not include the wide variety of indicators that case studies

include, screens do include the two indicators that consistently are referenced as being important in case studies. Thus, highlighting that both case studies and environmental justice screens have a similar capacity for addressing concerns of race and socioeconomic status.

## Distribution of Themes in Case Studies

The most frequently mentioned theme was race, followed by environmental impacts and degradation and socioeconomic status (Table 4). Land use-physical hazards, law and policy, and reduced health outcomes were the third most frequent indicators in case studies. The least frequently utilized codes were gender-masculinity, incarceration, land use-gentrification, and government and governmental agencies-U. S military (Table 4). About 40% of all identified themes appeared in fewer than five case studies. This highlights that very few studies are capturing large portions of the identified themes and of these 40% of themes that are hardly addressed by case studies, none of these themes are identified in screening tools. Case studies are able to address themes that are not picked up by screening tools, but the distribution of these themes is uneven.

The less frequently identified themes are also less frequently coded for. No theme that appeared in fewer than five case studies was coded for more than 30 times and this might suggest that these less frequently mentioned themes are less relevant for communities and thus need little attention. This trend changes when themes appear in five to 17 case studies. Within this range, the frequency of the themes can vary widely and the themes that appear in few case studies do not always have the lowest frequencies. For example, the theme of government and governmental agencies appears in 16 case studies and is coded for 119 times, but the themes of economic impact and labor and employment both appear in 17 case studies and are coded for 70

and 79 times, respectively. Although government and governmental agencies are less prevalent as a theme there are approximately 30% more coded text segments for this theme than for both labor and employment and economic impact. This could mean that more times is spent discussing this theme than others that appeared in more case studies. Age also serves as a prime example of the differences between coding frequency and case study prevalence. Age was only mentioned in 10 case studies, but it was identified 79 times. Age was coded more frequently than themes that appeared in 17 (labor and employment), 14 (power), 13 (risk perception), 12 (educational attainment) and 11 (land use → housing) case studies. This is important to recognize because within the mid-range of case study, presence more analysis is needed to evaluate themes as the case study prevalence does not correlate with the amount of time spent discussing a given theme. Analyzing the coded text segments of themes in the midrange provides needed context to understand why these themes are so relevant in the case studies when they are mentioned. Themes in the mid-range could be contributing significantly to environmental injustices in communities but are being missed by a majority of case studies. This could explain why the coding frequencies and case study ranking are not always aligned.

## Distribution of Themes in Screens

The topic of socioeconomic status was discussed in all eight screens. Seven had indicators for race. Land use-physical hazard and environmental impacts and degradation were reported in six screens. Reduced health outcomes, linguistic isolation and educational attainment appeared in four screens. Linguistic isolation was one of the most common indicators used in the screens. This is important to highlight because there are significantly more indicators that are used in case studies, but case studies are still lacking at integrating indicators that were included

in half of the screens. The wide-spread use of linguistic isolation as an indicator of environmental injustice in screening tools highlights this indicator might be valuable identifying populations who are more vulnerable to environmental injustices, but the absence of this theme in case studies exemplifies that although case studies are capable of addressing a wide variety of themes, they can still be lacking the needed integration of themes that have been identified and seen as significant elsewhere.

## Qualitative Analysis of Themes

As mentioned in chapter three, inductive approaches are commonly used to identify the most frequent and important themes in qualitative, text data. Beyond the methodological rationale for the selection of the five most common themes (race, socioeconomic status, environmental impacts and degradation, land use-physical hazards and reduced health outcomes) there are intellectual reasons as well. The five most common themes are those that researchers and screening tools developers have consistently identified as being contributing factors to environmental injustices in communities. Understanding how these themes are utilized and discussed provides insights as to why these themes are frequently found and their meaning and context.

The following sections contain a qualitative analysis of the five most common themes that appeared in case studies and environmental justice screening tools. This qualitative analysis will feature a comparative analysis of how case studies and screens describe these themes to gain a deeper understanding of the context and content that surrounds these themes overall.

### *Race*

Race was mentioned in all of the examined case studies. Seven out of the eight environmental justice screens included an indicator of race as part of their assessment. Race was also coded for in screens and case studies combined more than 300 times in MAXQDA, making it the most mentioned code in this study. When the qualitative raw textual data for this theme was further explored, the words minority and people of color were terms most consistently used to describe communities. It is important to note that the ways in which race is discussed in case studies and screens are often inconsistent. Screens that address race most consistently look at the percent of the population of interest that is nonwhite. Whereas case studies are able to look at more complex components of race including variations of environmental injustices experienced by racial subgroups as noted by Montgomery & Chakraborty (2015). In their 2015 paper Montgomery & Chakraborty analyze how Hispanic subgroups (Colombians, Cubans, Mexicans, and Puerto Ricans) experience differential environmental injustices in Miami, FL. The differences in lived experiences for these subgroups can be profound, however treating all people of color as a monolith ignores these variations. Thus, the use of broad sweeping terms like "nonwhite" might not be providing enough detail or insight into race based environmental injustices.

### *Socioeconomic Status*

Socioeconomic status was coded for 162 times in MAXQDA. Twenty-two out of 24 case studies mentioned socioeconomic status as a contributing factor to environmental injustices in the community of study. All of the environmental justice assessment tools had an indicator of socioeconomic status. Although socioeconomic status was frequently mentioned, a closer analysis of the coded text highlights that the descriptions or measures of socioeconomic status

are often inconsistent. Communities are often referred to as being low-income, poor, financially impoverished, affluent, or working class when their socioeconomic status is being described. However, these terms are more categorical and often do not directly describe the metric that was used to determine why these communities have been classified as low-income or poor. Analytical metrics of socioeconomic status have included household income, percent in poverty, median household income, percent below poverty level, poverty rate, economic insecurity, economic deprivation level, median family income, average income, wealth, estate taxes, median home value, residents living below the national poverty level, mean household income, and the number or percent of a block group's population in households where the household income is less than or equal to twice the federal "poverty level". Measures of poverty were the most frequently used analytical method of capturing socioeconomic status in a community experiencing environmental injustice. Household income was the second most frequently used measure. Estate taxes and median home value were only used in one study (Naidu et al., 2013)

### *Reduced Health Outcomes*

The code for reduced health outcomes was defined as "Addresses how human health has been negatively impacted by environmental injustice." When reduced health outcomes are addressed in case studies, the responses were general and include broad sweeping terms for a wide variety of ailments by mentioning respiratory disorders, cancer, decreased health in local residents, health issues, disease, and birth defects. There have also been descriptive case study examples of reduced health outcomes that were experienced as a result of environmental injustice. For example, Campbell et al., (2016) mention that the lead pollution in Flint, MI resulted in elevated blood lead levels. They also address the health concerns associated with acute and long-term exposure to lead. However, when reduced health outcomes are mentioned in

screens they are described exclusively in terms that are related to empirically available data such as low birth weight infants, diesel particulate matter cancer risk, asthma emergency room discharges, and asthma hospitalization rates. It should also be noted that even when case studies appear to be analyzing the same type of pollution, the sources of the pollution can vary and will thus change the resulting health concerns.

### *Environmental Impacts and Degradation*

This code was designed to capture all forms of environmental degradation and pollution as well as environmental disamenities that could not be classified as physical hazards. The code for physical hazards as a specific type of land use was present in 22 out of 24 case studies and six out of the eight environmental justice screens. Case studies varied in the level of detail in which environmental degradation was addressed. Environmental impacts can be broadly described as air pollution, environmental pollution and noise and air quality degradation. However, there are many case studies that are very detailed in the analysis of environmental degradation. Additionally, case studies are able to address the historical context in which environmental degradation has taken place while simultaneously addressing the relevance for how previous injustices are presently impacting members in the community. This was highlighted in Park and Pellow (2004). They show how "environmental devastation and the control, exploitation, and genocide of native peoples were intimately bound together in the establishment of the wealth and resources needed to establish Silicon Valley as a technological hub in the United States." Avni and Fischler (2020) also chronicle how centuries of exploitation caused the Anacostia river to become one of the most polluted rivers in the United States. This pollution of the Anacostia river has resulted in multiple cleanup efforts and recent waterfront redevelopments which have caused concerns for environmental injustices in the Washington D.C area.

When screens address environmental injustices in communities, they often use more than one metric for assessing environmental impacts and degradation. For example, CalEnviroScreen uses pesticide use, drinking water contaminants, ozone, and impaired water bodies as indicators of environmental degradation. The use of national databases as the source of raw data is also common when screens are capturing environmental impacts. The use of publicly available data in screening tools is important to note because it limits the types of environmental degradation that can be incorporated. Since the screens are often aggregates of data and do not collect raw data themselves, they are unable to incorporate data for which there is no empirically available database.

### *Land Use-Physical Hazard*

This code represents a subcode of land use. Physical hazards are stationary types of land use that can cause the deterioration of human health and environmental health. Nineteen case studies and six screens addressed this theme, and it was coded for 190 times in MAXQDA. Case studies referred to physical hazards in three distinct levels of detail. Physical hazards could be generalized and broad, generalized within a given industry, or specific. Generalized and broad physical hazards were described using non-specific terminology such as “polluting facilities”, “toxic industrial sites” and “Locally Unwanted Land Uses (LULUs). These terms signal that there are physical hazards present, but do not provide enough detail as to the full extent of which physical hazards pose risk nor do they delineate between differing types of physical hazards that could all be housed in the same community. Generalized physical hazards within a given industry include terms such as municipal waste landfills, federally designated toxic superfund sites, Toxic Release Inventory (TRI) facilities, meat packing plants, sugar beet pricing factories, sewage facilities, hazardous waste landfills and commercial power plants. These terms provide

more detail about the physical hazards within the community, but they are often catch all terms to describe all the facilities that produce a certain output. For example, the term "municipal waste landfills" does not address the prevalence of the landfills, the overall usage of the landfill nor does it address if certain landfills are more couplable for the environmental injustices seen in the community of interest. These generalized physical hazards within a given industry are more useful than broad physical hazards because they have enough detail that can be used for more descriptive research, but they are still in details that might be important for understanding the environmental justice concerns within the community.

Specific physical hazards point to only a few sites and then address the environmental justice concerns created by only those sites. This can be a useful method of quantifying physical hazards because it provides the most detail, but it is also the most limiting because any physical hazards beyond the few that have been identified cannot be explored. For example, Johnson, Rainey and Johnson (2008) chronicle how the Scovill-Shrader Automotive manufacturing plant and Dickenson County landfill contributed to the poisoning of a local family drinking water well. Abel (2008) also uses this approach to address how the Granite City Steel Mill and several other steel smelters have directly contributed to the reduced air quality and pollution exhibited in the St. Louis area.

Although cases studies have been shown to use varying levels of detail to describe physical hazards, screening tools almost exclusively examine generalized physical hazards within a given industry. These include, National Priorities List (NPL) sites, TRI facilities, Risk Management Plan (RMP) Facilities, Hazardous waste Treatment, Storage and Disposal Facilities (TSDFs), and refineries.

The present screening tools case studies have also largely focused on the physical locations of hazards while paying less attention to factors of toxicity and other preexisting health conditions that might impact the vulnerability and susceptibility of communities of concern (Huang & London, 2012). For example, weather conditions can impact the direction, distance and route that pollutants travel and this could impact the extent to which humans are exposed to these pollutants (Gilbert & Chakraborty, 2011). These factors are important to consider because if pollutants are spread over a wide geographic range, then the expanse of the community experiencing environmental injustices could be much larger than researchers had originally expected. The spread of pollutants could also mean that not all people who are impacted by EJ issues are included in the population that are being considered using cumulative EJ tools, thus meaning that the results produced by these tools could be inaccurate because not all of the impacts are being accounted for.

# Chapter 5: Discussion and Conclusions

## Distribution of Themes

The results from this coding in MAXQDA have highlighted that case studies and environmental justice screening tools assess a wide variety of themes, but those themes are not distributed equally between case studies and screens. Screens are able to capture fewer themes than case studies but the level of detail in which those themes are addressed is generally more consistent. Case studies are able to address a greater proportion of identified themes, though most of the case studies do not address the full spectrum of themes. Nearly 40% of all identified themes appeared in fewer than five case studies, so although case studies have the range of capacity to address a wide variety of themes very few case studies actually do so. When themes are addressed in case studies the level of detail can vary widely. Some themes are only addressed in very broad overarching terms whereas the very in detailed and robust conversation occurs for a variety of other themes. This could be indicative of the fact that case studies are very inconsistent in how they capture and assess environmental injustice. This could be useful because case studies are able to offer a wider variety of themes to address the environmental justice concerns within a community. However, broadly describing environmental justice themes hinders how applicable these case studies can be for readers to understand the environmental injustices in the community. For example, describing community members as having cancer and health issues as a result of environmental injustice provides little detail about the specific reduced health outcomes that are being experienced since they are catchall terms. Specific language would be useful for not only understanding environmental injustices but moving beyond those conversations of understanding to remedying. Catchall terms and broad generalizations do not provide enough detail that could be utilized to provide any sort of justice

to a community experiencing environmental injustices which hinders the long-term success and usefulness of a case study. If the goal of a case study is to document information in more detail, then more specifics would be useful as that information could be used directly by a variety of stakeholders, including government officials and community members to mobilize and create more equitable environmental conditions.

Screening tools face different problems in that they are fundamentally limited to incorporating themes for which there is an aggregate source of raw data such as a national or state level data base. So even if a theme such as reduced health outcomes were to be addressed, any health outcome that does not have accessible public data sources for the community of interests would not be included. Although screening tools are not utilizing generalized terms, the requirement for data limits the scope of what they are able to assess. Holifield (2001) mentions that "We must acknowledge that environmental justice will never refer unproblematically to a single set of measurable conditions, such as the association between distributions of pollution and demographic characteristics" (p. 82). This is important to highlight since screening tools rely heavily on publicly available datasets, they will always be inadequate at fully capturing environmental injustices and communities because not all environmental injustice problems can be captured in measurable conditions. So, if there are environmental injustices experienced in communities for which there is no quantitative data a case study would have a much better opportunity of being able to further explore those topics whereas a screening tool would be incapable of that analysis. Holifield's remarks also raises the question of whether or not screening tools can ever fully serve as a useful method of capturing or assessing environmental injustices in communities given the potential for many contributing topics to be immeasurable.

Despite the wide variety of themes that were addressed in case studies and screening tools, data collected from semi-interviews with a variety of stakeholders highlighted themes that were unaddressed by both screening tools and case studies. These themes included homelessness, domestic violence, energy justice, and sex trafficking. This is important to note because although 38 themes were identified, there are still additional themes that are not being represented. Given that case studies are capable of addressing a wider range of themes than screening tools, this could be cause for concern because those who are experiencing homelessness, sex trafficking, and domestic violence could be some of the most vulnerable populations in a community. Case studies have the greatest ability to include the concerns of these vulnerable populations, but they are not doing so and this raises questions about whether case studies can truly integrate the concerns of the most marginalized.

Several interviewees mentioned that using a historical approach to assessing environmental injustices is essential because legacies of disenfranchisement and devaluation of the lives of community members have impacted how communities perceive injustices and advocate for themselves. Sze and London (2008, p.1333) mention that "environmental injustice is not just a single harmful event/action/result, but rather a complicated history of political, social, and economic interactions leading up to, and continuing beyond, the contested instance of perceived injustice." Thus, using a historical perspective can show ways in which past injustices have shaped the present conditions within the community. Both case studies and screening tools have the potential to address some of the legacies of historical disenfranchisement, although case studies offer a more promising examination of historical context and considerations. For example, the CalEnviroScreen utilized data from the U.S census data from 20ll to 2015 to establish the 2018 version of the tool, so there is integration of some historical data in that more

than one year is being considered, but the screening tool does not inherently track how the analyzed themes changes over time or the long-term impacts of the selected themes on California communities. If a reader wanted a more historical perspective, they would have to find previous versions of the CalEnviroScreen and make their own comparisons. The comparison made between different versions of the tool might not be useful as the themes and methods of analysis are progressive and can change from version to version depending on the data available at the time of development.

Case studies, however, are able to offer a much more extensive reflection on the historical context associated with environmental injustice. For example, Blackford (2004) chronicles the colonization of the Kahoʻolawe island in 1778 to extractive nature of U.S military actions on the island until the 1980's, as there has been a long standing history of ecological destruction by non-native peoples on the island. To Blackford, understanding the historical context of ecological destruction on the island is essential for understanding the current struggles in reclaiming the land sovereignty for native Hawaiians. Bolin, Grineski and Collins (2005) assess how the historical exploitation of land, Black communities and Latinx communities in South Phoenix, Arizona has continuously resulted in disenfranchisement and the perpetuation of environmental injustices. Both of these case studies demonstrate how hundreds of years of environmental injustice can manifest into the present conditions experienced in community whereas screening tools are more capable of capturing just the recent history or environmental injustice.

The results from this thesis have demonstrated that although case studies are able to address more themes than screening tools, these themes are often unevenly distributed. This is especially important for themes that appeared in the midrange of case studies (between 5-17 case

studies) because the frequency of coded text segments is widely variable thus indicating that the significance of themes in this range may not correspond with their prevalence. This is important to note because themes that are not frequently utilized in case studies within this range are also themes that are missed by screening tools entirely. Reparations and justice pose a prime example of a theme that is significant, but potentially underrepresented.

The theme of reparations and justice was only mentioned in 16 case studies and was mentioned in none of the screening tools, but this was identified as being important repeatedly by stakeholders. An interviewed academic researcher mentioned that there is an industry on inequality research and that academics are rewarded for "not rocking the boat" in terms of the questions that are asked about inequality. This is an important concept to note because research on environmental injustice has largely focused on documenting injustice in communities, but there is not an equal focus on providing communities tools to reduce the burdens that they are facing. The lack of presence of this theme in case studies and screening tools reinforces this point. Screens and case studies can document injustices, but there needs to be a more focused effort to move research from just documenting injustices to removing them. Interviews with the developers of environmental injustice screening tools highlighted that there is little to no infrastructure to assess if the tools have been successful at remediating the injustices within communities and the makers of screening tools saw this a fundamental limitation in the successfulness of screening tools. The tools highlight potential communities of concern, but there is no guarantee that the information gained from these assessments will actually be used to produce positive outcomes within communities.

When comparing the themes that are present in case studies and screening tools it is intriguing that the most common themes are often overlapping. The majority of screens and case

studies address race, socioeconomic status, environmental impacts and degradation and physical hazards. This means that both screens and case studies have a similar capacity for addressing the most common themes. This is important for end users of screening tools and case studies because if those are the themes of interest then the user could be fairly certain that using a screen or case study would provide sufficient information. However, if one is interested in understanding themes outside of those that are most common then the type of tool used will make a significant difference because case studies address more themes but use less detail then screening tools. The prevalence of these themes in both methods of environmental injustice analysis signifies their overall importance for conceptualizing environmental injustices at the community level. This can be useful when determining the quality of a screening tool or environmental injustice case study because these are the themes that most consistently need to be addressed so if these themes are absent in analysis of environmental injustice there is cause for concern about the robustness and reflectiveness of that assessment. It is also important to note that the amount of overlap between screening tools and case studies in terms of themes covered does not continue to follow this trend beyond the four most common themes. So, the integration of themes outside of these four is widely variable and this can make choosing an appropriate method of analysis or an appropriate tool for analyzing environmental injustices much more challenging. The conceptual relevance for exploring some of the most common themes will be discussed in the upcoming section.

## Contextualizing Common Themes

### *Race*

Several studies have found that environmental injustice is largely dictated by the racial demographics within a community. This highlights the intense need for assessing the racial

demographics within a community experiencing environmental injustice (Bullard & Johnson, 2000; Bullard, 1993). The consistent integration of the theme of race is warranted given the prevalence of racial biases in the United states society and the impacts that race can have on other themes such as reparation and justice and environmental impacts and degradation. Many of the communities that were analyzed in this thesis were described as being communities of color. Bang and colleagues (2011) describe a community of color as a community where more than 50% of the residents living there identify as being non-white. According to a 2005 case study on New York City the classification of communities as "communities of color" combines all racial minorities into a single group and this often prevents further examination of how racial subgroups might be differentially impacted by the same environmental hazards (Jacobson et al., 2005). For example, Ash and Fetter (2004) found that across all cities in the continental United States neighborhoods with high numbers of African-Americans experienced more air pollution than predominantly white neighborhoods, but when neighborhoods are predominately Hispanic the pollution levels decline. Although African-Americans and Hispanics are considered to be people of color, the burdens experienced by these groups might not be the same. There are also variations in environmental injustice impacts within a single racial demographic as highlighted in the work of Montgomery and Chakraborty (2015). Ishiyama (2003) also notes that the simplification of communities into "communities of color" and then comparing these communities to predominantly white communities' neglects to address the internal power struggles and ideological disparities that vary between racial subgroups.

The issue of race is important to environmental justice case studies and screens because other potential themes are treated as non-discriminatory, even though historical oppression and discrimination have made these themes discriminatory by nature. When a theme is treated as

non-discriminatory it means that the indicator should apply equally to all individuals regardless of variables such as race, age and gender. For example, if all the residents in an area only drank tap water and used that same water for cooking and cleaning then water quality could be considered non-discriminatory in that system. However, due to the relationship between urban planning, racism and oppression many environmental indicators such as air quality and water quality are inherently discriminatory even though they might appear to be otherwise. For example, the CalEnviroScreen 3.0 uses the indicator diesel particulate matter emission and traffic density and EJScreen has an indicator for traffic proximity and volume which address the theme of environmental impacts and degradation. Ash and Fetter (2004) acknowledge that the presence of an interstate highway is supposedly a non-discriminatory industrial location factor, but the policies of the mid- 20th century favored industrial development in neighborhoods that were largely composed of people of color. If these communities were targeted to have high amounts of road traffic as opposed to other communities, then the indicators associated with traffic and traffic-based air quality will inherently discriminate against communities of color by not considering that these communities are bearing the brunt of the negative impacts associated with poor air quality from mobile traffic. The use of "non-discriminatory" indicators that have been impacted by racial bias in community planning coupled with the overall exclusion of race or decreased value of race will drastically reduce the impact the results of these indicators and indices can have for communities of color.

Race also impacts how communities are assisted after the identification of environmental justice issues. This is especially important given that the theme of reparations and justice is under addressed in case studies and entirely absent in screening tools. There is a racial inequity in clean-up of hazardous waste sites and in the fining of polluters. These inequities have largely

favored white communities experiencing environmental injustice at the expense of communities of color (Pinderhughes, 1996). The government often takes longer to address hazards that are placed in communities of color. For example, superfund sites that are located in communities of color take 20% longer to be placed on the National Priority List (NPL) then do superfund sites that are located within in white communities (Pinderhughes, 1996). Pollution violators that are located in poor low-income communities are fined more than 500 percent less than violators that are located in high income white communities (Pinderhughes, 1996; Knorr, 1997). If the goals of case studies and screening tools is to identify problems within communities so that action can be taken by policy makers or stakeholder then it is irresponsible not to include race as a theme given the role that race plays in the siting of environmental hazards and in the remedying of these hazards.

### *Land Use*

Large stationary sources of pollution such as manufacturing facilities and trash incinerators have been the focus of most studies about environmental justice and are included in many environmental justice screening tools, however many of the smaller polluters such as mobile vehicles and dry cleaners are left out of these analyses even though they can be major sources of pollution within communities (Gilbert & Chakraborty, 2011). Depending on the number of small polluters in an area this could potentially pose a large contribution to the environmental injustices within a community and these small polluters are not being considered within the analysis of screening tools or case studies. The carcinogenic properties of the pollutants that are released from the large stationary polluters tend to be the main focus of research, but pre-existing health conditions and other variables also impact the toxicity of pollutants in terms of individual susceptibility (Corburn, 2002; Morello-Frosch et al., 2011). For

example, obesity, cardiovascular, and diabetes are known to increase individual susceptibility to pollutants and lack of access to greenspace, healthy food options and recreational activities are also common factors in communities experiencing environmental injustice and can also decrease health which could in turn increase susceptibility to pollutants (Morello-Frosch et al., 2011). These topics are important to address because although land use has been a prevalent theme in both screens and case studies the ways that land use gets discussed may be insufficient for fully capturing the spectrum of which land uses can impact environmental injustices in communities. It is also important to acknowledge that land use similarly to the previously mentioned theme of race is interconnected with other themes such as reduced health outcomes. The interconnectedness of themes is important to address because oftentimes the themes that are majorly identified can be contributing to themes that have been less prevalent in both screens and key studies and it raises the question of if these major themes can be fully addressed without examining the full implications that these major themes have on less prevalent themes.

## Connections to the Larger Environmental Justice Framework

The environmental justice movement has traditionally focused on the location of physical hazards and the locations of communities of color and low-income communities. However, in more recent there has been a push to expand environmental justice beyond just considering physical hazards and other undesirable land uses (Pellow & Vazin, 2019; Schlosberg, 2013; Sze and London, 2008). The work for this thesis sits at the nexus between traditional concepts of environmental and emerging concerns for broadening the framework for which environmental injustice can be understood. The case studies and screening tools were selected in part because

they focused on a geographic region within the United States, thus still implicating the importance of environmental injustice being a place-based phenomenon, but the coding of raw textual data and the identification of themes contributes to broader ideas about the topics that can contribute to environmental injustices in communities. Addressing environmental justice through a wider lens of analysis can help to "address the sources and impacts of social power disparities associated with the environment" (Sze & London, 2008, p. 1332). Holifield (2001) also notes that expanding the scope of environmental justice gives the term "rhetorical power" and can help communities mobilize despite having diverse environmental concerns and grievances. The 38 themes identified in screens and case studies all pose potential topics upon which communities can mobilize and discuss environmental justice concerns beyond simply addressing physical hazards and reduced health outcomes.

The place-based analysis of environmental injustice in the United States also contributes to a larger conversation about how environmental injustices are experienced beyond national borders. As mentioned in chapter three, one of the reasons for the selection of the United States as the focal area of analysis was to make data analysis manageable but it is also important to acknowledge that environmental injustices are experienced globally on a wide variety of geospatial scales (Schlosberg, 2013). Pellow and Vazin (2019, p. 3) state that "to consider the driving forces behind environmental injustice/racism, which must include an examination of racial capitalism, settler colonialism, and the ideologies that undergird those systems of control." If the current systems of oppression and control create spaces where environmental injustices can exist are experienced globally then it begs the question whether environmental justice has to be seen as solely a place to based phenomenon. If those systems of oppression are consistent, then manifestations of environmental injustice will take place in vulnerable communities regardless of

where they are located. Although the selection of raw data sources for this thesis relied on placed based environmental justice the themes identified are able to participate in the larger conversation about environmental justice not being seen as a placed based phenomenon because several of the themes identified themes identified (race, age, and gender) will be held constant regardless of the location of which an environmental injustice can occur. It should also be noted that if environmental justice is not a placed based phenomenon, then merely providing environmental remediation will not fully solve the problems associated with environmental injustice because the systems of oppression that allowed for those injustices to occur are still in place look. Thus, for justice to fully be achieved if environmental justice is not a place-based phenomenon requires the demolition of oppressive systems such as classism, racism, sexism, ableism, ageism, colonialism, imperialism, and capitalism (Pellow & Vazin, 2019).

## Future Steps

Although case studies and screens are useful in documenting themes that contribute to environmental injustices and communities, there are still areas for improvement in both methods of analysis. One way that both methods could be improved is through increased stakeholder feedback. By working with stakeholders to create case studies and screening tools there could be additional themes that could be integrated, like the ones that were addressed in semi-structured interviews that went unaddressed by any document used in this thesis. These additional themes could help better reflect the conditions experienced and would promote a more equitable relationship between researchers and community members through the process of collaborative academic research. The lack of stakeholder input has long been criticized because the

probabilities and data that are produced from screening tools and case studies are not democratic in how they are created and often rely on what researcher perceive to be risk or hazards regardless of what community members think the hazards are in their community (Corburn, 2002).

Perceptions of environmental injustice can occur "when the actual distribution of harmful environmental consequences and the decisions leading to those distributions fail to correspond to the expectations stemming from abstract rules of procedural and distributive justice (Parris et al., 2014, p. 69). A lack of stakeholder input hinders the procedural justice that is required for environmental equity and environmental justice. The creation of screening tools and cases helps to understand distributional justice because they often examine the physical locations of polluting facilities, but the procedural justice of decision making and "cognitive justice to consider local knowledge legitimate in the assessment" are missed when stakeholders are not incorporated as part of the creation of these tools (Huang & London, 2012, p. 1594). A lack of input from the marginalized communities who are being impacted by environmental injustice could be seen as promoting "white bias" that represents a form of domination over these groups by purposefully excluding their voices from the research and tools that not only speak about their communities but are being designed to help their community (Corburn, 2002; Parris et al., 2014).

It could be argued that not incorporating stakeholder input in the creation of screens and case studies is a form of extractive science in which researchers benefit from the publication of these documents at the expense of community members who have not had their voices or needs heard by the researchers. This also creates an inequitable distribution of power between researchers and stakeholders in which the lived experiences of the stakeholders are valued less than the researchers who are producing these tools (Corburn, 2002). Gregory and Wellman

(2001) believe that stakeholder perspectives are crucial to developing actions that will be broadly acceptable. If case studies and screening tools are being used to inform policy, then incorporation of stakeholder input is important to make sure that the policy makers have an accurate representation of the concerns from their constituents and thus are able to have policies that are equitable. The communities that are impacted by environmental injustices are faced with providing the "burden of proof" in that these communities must prove that they have been disproportionately harmed or discriminated against (Morello-Frosch et al., 2011; Bullard, 2003). The communities that are the most impacted often have the least access to the resources such as lawyers that are required to prove that they have experienced environmental injustice. Given that the communities are often charged with providing the evidence of their injustice it can be assumed that the members of the community are the most informed about the environmental justice issues within their own communities. If researchers are using screening tools and case studies as methods to help community members alleviate the burdens associated with providing sufficient evidence of injustice, then incorporating stakeholders is essential.

Case studies and screening tools could be improved by integrating stakeholder feedback, but there are also promising ways that the work for this thesis could also be improved and expanded on. For example, this could be expanded upon by also documenting how themes about environmental injustice change over time. This would require grouping and case studies and screening tools by publication date and then categorizing when the themes appear on a timeline. This type of comparison can track how themes have changed or appeared overtime, changes in the presence of themes over time and be indicators that the environmental justice movement has continued to focus on given topics relating to environmental injustices in communities. This type of analysis would also demonstrate when new themes emerged, and this information could then

be paired with data about current events during that time period to demonstrate if these new themes are the result of increased concern relating to overall changes in societal social dynamics. This work documented which themes were present in case studies and screening tools and consequently also documented which themes were not present. Further research done on these themes would allow for exploration of seeing themes as non-neutral. The selection of themes utilized by screening tools and case studies has both intended in unintended consequences. Utilizing a diverse set of themes includes them as part of the documentation process about environmental injustice, but not utilizing themes removes those topics from conversations about environmental justice and can limit understanding about environmental injustice experienced at the community level. For example, the houseless were not considered in screening tools and case studies this has the unintended consequences of erasure of a vulnerable group from mainstream conversations about environmental justice. This erasure can also impact which sensitive populations are seen as having claims to experiencing environmental injustice since those claims are likely unsupported by documented literature on environmental justice. If any of the communities that were examined in the case studies and screens used in this work had houseless populations that were also experiencing environmental injustice the concerns of those community members were overshadowed to be able to address other themes that were present. A deeper textual analysis of the context and implications for not addressing certain themes would greatly add to the level of detail and insight that can be gained from understanding the themes that are addressed in case studies and screening tools.

Despite the areas for which thesis can be expanded upon, there are still useful results that can serve to inform policy and decision making. This work highlights themes that are present in case studies that are not yet being reflected in screening tools and this information could be used

to provide funding to further develop publicly available datasets. If screening tools are limited to incorporation of themes that are available in public datasets, then understanding which themes have no empirical data will be useful for redirecting funding to further explore and collect data on those themes so that they can be integrated affectively into screening tools. This work also highlighted underserved areas within environmental justice case studies and allocating additional funding to further explore these areas will be useful for developing a more robust and intersectional collection of environmental justice literature.

# References


Abel, T. D. (2008). Skewed Riskscapes and Environmental Injustice: A Case Study of Metropolitan St. Louis. *Environmental Management*, *42*(2). https://doi.org/10.1007/s00267-008-9126-2

Ash, M., & Fetter, T. R. (2004). Who Lives on the Wrong Side of the Environmental Tracks? Evidence from the EPA's Risk-Screening Environmental Indicators Model*. *Social Science Quarterly*, *85*(2). https://doi.org/10.1111/j.0038-4941.2004.08502011.x

Avni, N., & Fischler, R. (2020). Social and Environmental Justice in Waterfront Redevelopment: The Anacostia River, Washington, D.C. *Urban Affairs Review*, *56*(6). https://doi.org/10.1177/1078087419835968

Backman, K., & Kyngas, H. A. (1999). Challenges of the grounded theory approach to a novice researcher. *Nursing and Health Sciences*, *1*(3). https://doi.org/10.1046/j.1442-2018.1999.00019.x

Bang, J. J., Anderson, Y. B., DeLauder, S. F., Malhotra, R., Egeghy, P., Williams, R., Whitaker, D., & Morrison, C. (2011). Ambient Concentration Levels of Volatile Organic Compounds and Aldehydes in Moncure, North Carolina: An Environmental Justice Case Study. *Environmental Justice*, *4*(2). https://doi.org/10.1089/env.2010.0020

Bell, S. E., & Braun, Y. A. (2010). Coal, Identity, and the Gendering of Environmental Justice Activism in Central Appalachia. *Gender & Society*, *24*(6). https://doi.org/10.1177/0891243210387277

Blackford, M. G. (2004). Environmental Justice, Native Rights, Tourism, and Opposition to Military Control: The Case of Kaho'olawe. *Journal of American History*, *91*(2). https://doi.org/10.2307/3660711

Blondell, M., Kobayashi, W., Redden, B., & Zrzavy, A. (2020). *Environmental Justice Tools for the 21st Century*. University of Michigan.

Bolin, B., Grineski, S., & Collins, T. (2005). The Geography of Despair: Environmental Racism and the Making of South Phoenix, Arizona, USA. *Research in Human Ecology*, *12*(2), 156–168.

Boone, C. G., Buckley, G. L., Grove, J. M., & Sister, C. (2009). Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland. *Annals of the Association of American Geographers*, *99*(4). https://doi.org/10.1080/00045600903102949

Bowen, W. (2002). An Analytical Review of Environmental Justice Research: What Do We Really Know? *Environmental Management*, *29*(1). https://doi.org/10.1007/s00267-001-0037-8

Bullard, R. (1993). Race and Environmental Justice in the United States. *Yale Journal of International Law*, *18*, 319–335.

Bullard, R. D. (2003). Confronting Environmental Racism in the 21st Century. *Race, Poverty & the Environment*, *10*(1), 49–52.

Bullard, R. D., & Johnson, G. S. (2000). Environmentalism and Public Policy: Environmental Justice: Grassroots Activism and Its Impact on Public Policy Decision Making. *Journal of Social Issues*, *56*(3). https://doi.org/10.1111/0022-4537.00184

Bullard, R. D., & Wright, B. H. (1987). Blacks and the Environment. *Humboldt Journal of Social Relations*, *14*(1/2), 165–184.

Burgess, L. D., Johnson, G. S., & Washington, S. C. (2014). An African American Community and The PCB Contamination In Anniston, Alabama: An Environmental Justice Case Study. *Race, Gender & Class*, *21*(1/2), 334–361.

Burwell, D., & Cole, L. W. (2007). Environmental Justice Comes Full Circle: Warren County Before and After. *Golden Gate University Environmental Law Journal*, *1*(1), 9–40.

Butler, L. J., Scammell, M. K., & Benson, E. B. (2016). The Flint, Michigan, Water Crisis: A Case Study in Regulatory Failure and Environmental Injustice. *Environmental Justice*, *9*(4). https://doi.org/10.1089/env.2016.0014

Callahan, M. A., & Sexton, K. (2007). If Cumulative Risk Assessment Is the Answer, What Is the Question? *Environmental Health Perspectives*, *115*(5). https://doi.org/10.1289/ehp.9330

Calloway, C. A., & Ferguson, K. L. (1997). The Human Environment Requirements of the National Environmental Policy Act: Implications for Environmental Justice. *Detroit College of Law at Michigan State University Law Review*, *4*, 1147–1184.

Campbell, C., Greenberg, R., Mankikar, D., & Ross, R. (2016). A Case Study of Environmental Injustice: The Failure in Flint. *International Journal of Environmental Research and Public Health*, *13*(10). https://doi.org/10.3390/ijerph13100951

Chun Tie, Y., Birks, M., & Francis, K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, *7*. https://doi.org/10.1177/2050312118822927

Corburn, J. (2002). Environmental Justice, Local Knowledge, and Risk: The Discourse of a Community-Based Cumulative Exposure Assessment. *Environmental Management*, *29*(4). https://doi.org/10.1007/s00267-001-0013-3

Driver, A., Mehdizadeh, C., Bara-Garcia, S., Bodenreider, C., Lewis, J., & Wilson, S. (2019). Utilization of the Maryland Environmental Justice Screening Tool: A Bladensburg, Maryland Case Study. *International Journal of Environmental Research and Public Health*, *16*(3). https://doi.org/10.3390/ijerph16030348

Fletcher, T. (2002). Neighborhood change at Love Canal: contamination, evacuation and resettlement. *Land Use Policy*, *19*(4). https://doi.org/10.1016/S0264-8377(02)00045-5

Funk, C., & Kennedy, B. (2020). *How Americans See Climate Change and the Environment in 7 Charts*. Pew Research Center. https://www.pewresearch.org/fact-tank/2020/04/21/how-americans-see-climate-change-and-the-environment-in-7-charts/.

Gilbert, A., & Chakraborty, J. (2011). Using geographically weighted regression for environmental justice analysis: Cumulative cancer risks from air toxics in Florida. *Social Science Research*, *40*(1). https://doi.org/10.1016/j.ssresearch.2010.08.006

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, *16*(1). https://doi.org/10.1177/1094428112452151

Gray, L. D., Johnson, G. S., Boone, W. H., & Schoenfish-Keita, J. (2013). Asthma and Public Policies: An Environmental Justice Case Study on Minority Youth in Georgia. *Race, Gender & Class*, *20*(3/4), 226–253.

Gregory, R., & Wellman, K. (2001). Bringing stakeholder values into environmental policy choices: a community-based estuary case study. *Ecological Economics*, *39*(1). https://doi.org/10.1016/S0921-8009(01)00214-2

Harner, J., Warner, K., Pierce, J., & Huber, T. (2002). Urban Environmental Justice Indices. *The Professional Geographer*, *54*(3). https://doi.org/10.1111/0033-0124.00333

Harris, M. L. (2016). Ecowomanism: Black Women, Religion, and the Environment. *The Black Scholar*, *46*(3). https://doi.org/10.1080/00064246.2016.1188354
Hines, R. I. (2001). African Americans' Struggle for Environmental Justice and The Case of The Shintech Plant. *Journal of Black Studies*, *31*(6). https://doi.org/10.1177/002193470103100605
Holifield, R. (2001). Defining Environmental Justice and Environmental Racism. *Urban Geography*, *22*(1). https://doi.org/10.2747/0272-3638.22.1.78
Huang, G., & London, J. K. (2012). Cumulative Environmental Vulnerability and Environmental Justice in California's San Joaquin Valley. *International Journal of Environmental Research and Public Health*, *9*(5). https://doi.org/10.3390/ijerph9051593
Huang, H., & Barzyk, T. (2016). Connecting the Dots: Linking Environmental Justice Indicators to Daily Dose Model Estimates. *International Journal of Environmental Research and Public Health*, *14*(1). https://doi.org/10.3390/ijerph14010024
Ishiyama, N. (2003). Environmental Justice and American Indian Tribal Sovereignty: Case Study of a Land–Use Conflict in Skull Valley, Utah. *Antipode*, *35*(1). https://doi.org/10.1111/1467-8330.00305
Jacobson, J. O., Hengartner, N. W., & Louis, T. A. (2005). Inequity Measures for Evaluations of Environmental Justice: A Case Study of Close Proximity to Highways in New York City. *Environment and Planning A: Economy and Space*, *37*(1). https://doi.org/10.1068/a36225
Jacques, M. L., Gibbs, C., Rivers, L., & Dobson, T. (2012). Expanding Environmental Justice: A Case Study of Community Risk and Benefit Perceptions of Industrial Animal Farming Operations. *Race, Gender & Class*, *19*(1/2), 218–243.
Johnson, G. S., Rainey, S. A., & Johnson, L. S. (2008). Dickson, Tennessee and Toxic Wells: An Environmental Racism Case Study. *Race, Gender & Class*, *15*(3/4), 204–223.
Knorr, M. L. (1997). Environmental Injustice: Inequities between Empirical Data and Federal, State Legislative and Judicial Responses. *University of Baltimore Journal of Environmental Law*, *6*(1), 71–106.
Krieg, E. J., & Faber, D. R. (2004). Not so Black and White: environmental justice and cumulative impact assessments. *Environmental Impact Assessment Review*, *24*(7–8). https://doi.org/10.1016/j.eiar.2004.06.008
Kuruppuarachchi, L. N., Kumar, A., & Franchetti, M. (2017). A Comparison of Major Environmental Justice Screening and Mapping Tools. *Environmental Management and Sustainable Development*, *6*(1). https://doi.org/10.5296/emsd.v6i1.10914
Loh, P., & Sugerman-Brozan, J. (2002). Environmental Justice Organizing for Environmental Health: Case Study on Asthma and Diesel Exhaust in Roxbury, Massachusetts. *The ANNALS of the American Academy of Political and Social Science*, *584*(1). https://doi.org/10.1177/000271620258400108
Mank, B. (2001). Proving An Environmental Justice Case: Determining An Appropriate Comparison Population. *Virginia Environmental Law Journal*, *20*(3), 365–430.
Mann, S. A. (2011). Pioneers of U.S. Ecofeminism and Environmental Justice. *Feminist Formations*, *23*(2). https://doi.org/10.1353/ff.2011.0028
Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental Justice. *Annual Review of Environment and Resources*, *34*(1). https://doi.org/10.1146/annurev-environ-082508-094348

Montgomery, M. C., & Chakraborty, J. (2015). Assessing the environmental justice consequences of flood risk: a case study in Miami, Florida. *Environmental Research Letters*, *10*(9). https://doi.org/10.1088/1748-9326/10/9/095010
Morello-Frosch, R., Zuk, M., Jerrett, M., Shamasunder, B., & Kyle, A. D. (2011). Understanding The Cumulative Impacts Of Inequalities In Environmental Health: Implications For Policy. *Health Affairs*, *30*(5). https://doi.org/10.1377/hlthaff.2011.0153
Naidu, S. C., Manolakos, P. T., & Hopkins, T. E. (2013). Environmental Justice in Ohio. *Review of Radical Political Economics*, *45*(3). https://doi.org/10.1177/0486613412470094
Office of Environmental Health Hazard Assessment. (2018). *Analysis of Race/Ethnicity, Age, and CalEnviroScreen 3.0 Scores*.
Office of Environmental Health Hazard Assessment. (2017). *CalEnviroScreen 3.0*.
Park, L. S.-H., & Pellow, D. N. (2004). Racial Formation, Environmental Racism, and the Emergence of Silicon Valley. *Ethnicities*, *4*(3). https://doi.org/10.1177/1468796804045241
Parris, C. L., Hegtvedt, K. A., Watson, L. A., & Johnson, C. (2014). Justice for All? Factors Affecting Perceptions of Environmental and Ecological Injustice. *Social Justice Research*, *27*(1). https://doi.org/10.1007/s11211-013-0200-4
Pellow, D., & Vazin, J. (2019). The intersection of race, immigration status, and environmental justice. *Sustainability (Switzerland)*, *11*(14). https://doi.org/10.3390/su11143942
Pinderhughes, R. (1996). The Impact of Race on Environmental Quality: An Empirical and Theoretical Discussion. *Sociological Perspectives*, *39*(2). https://doi.org/10.2307/1389310
Porter, R., & Tarrant, M. A. (2001). A Case Study of Environmental Justice and Federal Tourism Sites in Southern Appalachia: A GIS Application. *Journal of Travel Research*, *40*(1). https://doi.org/10.1177/004728750104000105
Purvis, C. L. (2001). Data and Analysis Methods for Metropolitan-Level Environmental Justice Assessment. *Transportation Research Record: Journal of the Transportation Research Board*, *1756*(1). https://doi.org/10.3141/1756-02
Ringquist, E. J. (2005). Assessing evidence of environmental inequities: A meta-analysis. *Journal of Policy Analysis and Management*, *24*(2). https://doi.org/10.1002/pam.20088
Rosa-Aquino, P. (2019, January 21). *What the environmental justice movement owes Martin Luther King Jr.* Grist. https://grist.org/article/what-the-environmental-justice-movement-owes-martin-luther-king-jr/
Schlosberg, D. (2013). Theorising environmental justice: the expanding sphere of a discourse. *Environmental Politics*, *22*(1). https://doi.org/10.1080/09644016.2013.755387
Smith, C. L. (2007). Economic Deprivation and Environmental Inequality in Postindustrial Detroit. *Organization & Environment*, *20*(1). https://doi.org/10.1177/1086026607300245
Su, J. G., Morello-Frosch, R., Jesdale, B. M., Kyle, A. D., Shamasunder, B., & Jerrett, M. (2009). An Index for Assessing Demographic Inequalities in Cumulative Environmental Hazards with Application to Los Angeles, California. *Environmental Science & Technology*, *43*(20). https://doi.org/10.1021/es901041p
Sze, J., & London, J. K. (2008). Environmental Justice at the Crossroads. *Sociology Compass*, *2*(4). https://doi.org/10.1111/j.1751-9020.2008.00131.x
Taylor, D. E. (1997). American Environmentalism: The Role of Race, Class and Gender in Shaping Activism 1820-1995. *Race, Gender & Class*, *5*(1), 16–62.
Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, *27*(2). https://doi.org/10.1177/1098214005283748

Todd, H., & Zografos, C. (2005). Justice for the Environment: Developing a Set of Indicators of Environmental Justice for Scotland. *Environmental Values*, *14*(4). https://doi.org/10.3197/096327105774462692

U.S. Environmental Protection Agency (EPA), 2019. EJSCREEN Technical Documentation.

Whitehead, L., Warren, R. C., Johnson, G. S., & Lopez, F. M. (2008). Mississippi Head Start Mothers: An Environmental Justice Case Study. *Race, Gender & Class*, *15*(1/2), 246–264.

Whitlinger, C., & Fretwell, J. (2019). Political Assassination and Social Movement Outcomes: Martin Luther King and the Memphis Sanitation Workers' Strike. *Sociological Perspectives*, *62*(4). https://doi.org/10.1177/0731121419842116

Wilson, S. M., Fraser-Rahim, H., Williams, E., Zhang, H., Rice, L., Svendsen, E., & Abara, W. (2012). Assessment of the Distribution of Toxic Release Inventory Facilities in Metropolitan Charleston: An Environmental Justice Case Study. *American Journal of Public Health*, *102*(10). https://doi.org/10.2105/AJPH.2012.300700

Yandle, T., & Burton, D. (1996). Reexamining Environmental Justice: A Statistical Analysis of Historical Hazardous Waste Landfill Siting Patterns in Metropolitan Texas. *Social Science Quarterly*, *77*(3), 477–492.

Zilney, L. A., McGurrin, D., & Zahran, S. (2006). Environmental Justice and the Role of Criminology. *Criminal Justice Review*, *31*(1). https://doi.org/10.1177/0734016806288258