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A health impact assessment to evaluate the expansion of U.S. Ecology Detroit-North

Introduction

This Health Impact Assessment (HIA) will examine the proposed expansion of the U.S. Ecology Detroit North Facility and the renewal of its Part 111 permit, using the precautionary principle and environmental justice as guiding frameworks. Our assessment will focus on Hamtramck, the city in closest proximity to U.S. Ecology Detroit North. We will also concentrate our HIA on the most vulnerable populations in the city, namely, women, children, and immigrants from Yemen and Bangladesh. While ambient air quality is a significant concern in this region of Michigan, the expansion of U.S. Ecology is most likely to have an impact on groundwater and soil. Thus, exposure through these media will be the focus of this HIA. We will examine underlying values that ignite this controversy, including reasons for distrust of state government and uncertainty of risk. Finally, we will offer recommendations to the Michigan Department of Environmental Quality (MDEQ) to consider in its decision regarding U.S. Ecology's expansion and engagement with community members in the future.

U.S. Ecology Overview

U.S. Ecology Detroit North ("U.S. Ecology") is a hazardous waste storage and treatment facility located in Hamtramck, Detroit on 6520 Georgia St., just north of I-94.[i] Built in 1974, U.S. Ecology Detroit North was in operation prior to the establishment of state and federal regulations for hazardous waste handling and disposal operations, and was thus grandfathered into the 1976 Resource Conservation and Recovery Act governing hazardous waste. Consequently, there is a gap in regulation of U.S. Ecology's waste handling and its impact on health and the environment.[ii] U.S. Ecology is currently permitted by MDEQ to process 4,500 tons of toxic chemicals per day, including widely known endocrine disrupting compounds such as polychlorinated biphenyls (PCBs).[iii,iv] U.S. Ecology has a waiver for groundwater and soil testing after meeting structural requirements in the Part 111 administrative rules.[v]

An MDEQ Part 111 permit in Michigan allows licensees to manage hazardous wastes. As part of its license renewal, U.S. Ecology Detroit North submitted a proposal to expand operations by increasing storage of hazardous wastes from 76,000 to 677,000 gallons.[vi] There are no proposed changes in amounts of chemicals processed or released into water. In addition, the company plans to construct two more buildings, and it is unclear whether these buildings will be at least 60 meters from a residence, commercial, or recreational site in compliance with the Part 111 permit.[vii]

U.S. Ecology is also permitted by the Great Lakes Water Authority to release 300,000 gallons of treated chemicals into to the Detroit sewer system each day. However, the facility has a history of water violations. Between 2010 and 2016, U.S. Ecology released mercury, arsenic, cyanide and other toxic chemicals into the city sewer system in amounts exceeding its permit limitations more than 150 times.[viii]

MDEQ approved U.S. Ecology's Part 111 permit renewal and expansion in 2018. However, following petitions from local organizations, MDEQ opened the public comment period to last until April 12, 2019 and held a public hearing with Arabic and Bengali translators present on March 28, 2019.[ix] MDEQ will make its decision by an unspecified date in 2019.

HIA Guiding Principles

The precautionary principle states: "when an activity raises threat of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."[x] The exact human health outcomes of exposures to the endocrine disrupting compounds and other toxicants stored at U.S. Ecology Detroit North are not precisely known. There is a high level of uncertainty surrounding combinations of persistent organic pollutants, even in trace amounts. Regardless of the uncertainties, there are high stakes associated with even a small risk of harm, given the growing body of scientific research indicating the contributions of such environmental exposures to chronic health disparities in vulnerable populations.

While the precautionary principle is not traditionally applied in MDEQ's permitting mechanisms, there are opportunities to reduce harm by limiting the extent of expansion and imposing more rigorous oversight of U.S. Ecology. Although Michigan state law mandates that the MDEQ must grant a license to

a facility that meets regulations for hazardous waste, the MDEQ does maintain the jurisdiction to specify licensing conditions that would protect the surrounding community. The MDEQ Waste Management and Radiological Protection Division is primarily responsible for overseeing the facility's operations and relicensing process, and may address changes in licensing conditions and broader regulations. (see Recommendations).[xi,xii]

This HIA is also informed by principles of environmental justice, which the Environmental Protection Agency considers to be a key tenet of its work: "Environmental justice is 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." [xiii] This definition draws upon foundational work by People of Color Environmental Leadership Summit of 1991.[xiv] Thus, we will recommend approaches that are participatory and inclusive of community members who may be disproportionately exposed to the waste stored at U.S. Ecology.[xv]

The process of the HIA is an important way in which to engage the community to be impacted by the proposed expansion. Our aim is to help inform and describe potential mechanisms that "shift the locus of decision making and power relations, opportunities and avenues for community engagement are often limited." [xvi] Throughout this HIA, we will discuss role of community members and grassroots organizations who have been heavily involved in engaging MDEQ throughout U.S. Ecology's most recent renewal process, namely, The Coalition to Stop the Expansion of U.S. Ecology.

History of Hamtramck

The City of Hamtramck is in Wayne County, Michigan. It is surrounded by the City of Detroit and is 2.2 square miles. The city is five miles from the center of Detroit, with I-75 running along the city's western border and I-94 running near its southern border.

After Colonel Jean Francois Hamtramck took possession of Detroit in 1796, French settlers from Quebec established the Township of Hamtramck in 1798. German settlers soon followed, and Hamtramck was established as a village made of mainly German farmers in 1901.[xvii] In 1914, The Dodge Brothers Motor Car Company started operations for a 67-acre automotive plant, drawing a rapid influx of

European immigrants, largely from Poland.[xviii] Many of the Polish immigrants who relocated to Hamtramck for were already in the United States, often working as coal miners in other states. These workers, as well as immigrants directly from Poland, were attracted to the booming automobile industry of metro Detroit. They gave the neighborhood surrounding the Dodge Main plant the nickname, Poletown. From 1910 to 1920, the Hamtramck community grew from 3500 to 48,000 residents in total.[xix] In 1922, Hamtramck was incorporated as a city to protect itself from annexation by Detroit.[xx]

In 1985, General Motors relocated their Cadillac assembly plant from the Mexicantown Detroit neighborhood to the Detroit/Hamtramck Assembly facility, which required bulldozing Poletown. This development promised many new jobs for the neighborhood and entailed the demolition of six churches, hospitals, and hundreds of businesses. In addition, thousands of residents were displaced from the area, as the number of jobs the city estimated to come from General Motors was largely overestimated.[xxi] There are currently 1500 employees at the plant.[xxii]

Since the construction of the General Motors plant, the workforce in the area declined and the local average income decreased. From 2000 to 2007, Hamtramck was put into state receivership after running million-dollar deficits. Due to lower costs of housing, Hamtramck experienced another wave of immigration from Bangladesh and Yemen. Yemenis began migrating to the area in the 1980s, along with Yugoslavians and Albanians, to work in the auto industry.[xxiii] In recent decades, the war in Yemen has led to millions of displaced residents, many of whom joined the existing Yemeni community in Hamtramck. Additionally, Bengalis from New York City, where housing costs have dramatically increased, were also attracted to Hamtramck's low cost of living and large Muslim population. From the mid-1900s to the present, the percentage of residents of Polish descent decreased from 75 to 10 percent.[xxiv]

Demographics

Hamtramck has a relatively young population, with a higher rate of non-English speakers, a higher percentage of foreign-born individuals, and a lower citizenship [xxv] rate compared to the rest of Wayne County and nearby Detroit. 32.2% of Hamtramck residents are under the age of 18, while 21.8%

of Michigan residents are under the age of 18.[xxvi] This leads to special health concerns for vulnerable populations, including children and pregnant women.

The median income and employment rate are lower than the state.[xxvii] The 2016 median annual income for Hamtramck is $23,609, about $27,000 less than the median income for the State of Michigan, and $32,000 less than the national median income. [xxviii] The employment rate in Hamtramck is much lower than the county, state, or Detroit; 33.1% of women ages 16 and older are in the labor force, with an overall employment rate of 45.1% for men and women ages 16 and older. [xxix] It is likely that people who are unemployed remain at home or in the surrounding neighborhood, potentially accumulating exposure to toxicants brought to the facility and local emissions over time.

The city of Hamtramck also appears to have a larger white population than the county or Detroit, and a larger Asian population than the county, state, or Detroit (Table 1). However, due to limitations of the U.S. Census and the American Community Survey (ACS), it is difficult to collect data on immigrants from Yemen and Bangladesh and other groups of Arab and Southeast Asian descent.

Yemenis are Arab and considered to be from the Middle East and North Africa (MENA) region. Geographically, Arabs span the Middle East and the African continent. Twenty-two nations comprise the Arab world (collectively known as the Arab League), and each state is linguistically, religiously, racially, and culturally diverse. The U.S. Census data does not capture demographics of individuals of Middle Eastern origin, including Arabs from both the Mediterranean and Gulf regions. Rather, individuals who identify as Middle Eastern and North African (MENA) must elect “White” as their racial category on the Census, regardless of their race in reality.

For example, Arabs from Sudan and Somalia are similarly overlooked by refugee and immigrant advocacy organizations who seek to provide linguistically and culturally appropriate services to Arabic speakers. The lack of a MENA category on the census falsely inflates the proportion of Caucasian residents in the U.S. and prevents researchers from understanding the Middle Eastern demographics within individual localities. Similarly, Bengalis are from a predominantly Muslim area of Southeast Asia. This population may also be incorporated into the broader Asian category on the U.S. Census, which does

not account for multiple Southeast Asian subgroups.[xxx] This inhibits researchers from parsing certain characteristics or dimensions of vulnerability that are unique to Hamtramck's Bengali community.

It is critical to understand how these data collection barriers factor into the ways we understand the largely-Muslim Yemeni and Bengali neighborhoods of Hamtramck. In recent decades, government surveillance and forced disappearances of U.S. Muslims after the September 11, 2001 World Trade Center attacks have targeted individuals who are broadly associated with Islam and the Middle East.[xxxi] This blocks engagement from the Muslim community for study purposes. Arabs who have lived in the region are often too fearful and suspicious to participate in surveys, or provide accurate information about religion, language, and ethnicity.[xxxii] Without proper survey tools for capturing the multiplicities of identity, large-scale surveys such as the ACS are not helpful for understanding these groups' vulnerabilities and strengths.

It is possible to broadly estimate social vulnerability in Hamtramck using data collected by the ACS that is not related to race and ethnicity. One survey question refers to "linguistically isolated households," in which no one over the age of 18 speaks English. Other questions ask residents about home ownership, transportation, disability, and other factors. The Centers for Disease Control and Prevention uses geospatial analysis of these data to create a Social Vulnerability Index (SVI), ranking areas of the U.S. from highest to lowest vulnerability. Figure 1 shows the 2016 SVI map of Wayne County, showing Hamtramck to be among the top 25 percent most vulnerable regions in the United States based on four broad criteria: socioeconomic status, household composition/disability, race/ethnicity/language, and housing/transportation.[xxxiii]

Community organizations and engagement

It is important for MDEQ to leverage existing partnerships between community members, grassroots organizations, faith-based groups, local politicians, and other stakeholders to engage the public in the Part 111 permit decision-making process (see Recommendations). Local organizations have already mobilized community members to attend hearings and make comments to MDEQ. Members of Michigan Citizens for Water Conservation, International Hope Center, Great Lakes Environmental Law Center, and

other organizations recently formed the Coalition to Oppose the Expansion of U.S. Ecology.[xxxiv] This group petitioned the agency in 2018 to extend the public commenting period and provide translators at a public hearing on March 28, 2019. Comments from parents, teachers, advocates, and other members of the public at the hearing expressed strong opposition to U.S. Ecology's presence in the community. State Representative Isaac Robinson also voiced his opposition to the expansion.[xxxv]

Other grassroots organizations can engage communities concerned with environmental justice in Southeast Michigan. Delray Neighborhood House, for example, has worked with neighborhoods in Detroit concerning area pollution and some development projects like the US/Canada bridge. Detroiters Working for Environmental Justice and the Sierra Club Detroit chapter both have environmental justice programs that span a wide range of environmental issues.

Faith-based organizations can mobilize individuals who may be unaware of the U.S. Ecology expansion, including the al-Islah Islamic Center, the InterFaith Leadership Council of Metropolitan Detroit, St. Florian Church, and the Immaculate Conception Ukrainian Catholic Church. Cultural centers, such as the Yemeni American Leadership Association, may play a role in engaging immigrants in linguistically isolated households or are otherwise experiencing cultural barriers to civic participation.

The Hamtramck School Based Health Center, a collaboration between the Detroit Medical Center and Hamtramck public schools, aims to fill healthcare gap for underinsured children. ACCESS Community Health and Research Center, a Dearborn-based nonprofit that provides advocacy, resources and Arabic language services, also has breastfeeding and nutrition support programs for pregnant women and new mothers.[xxxvi] An established trust between community members and these health facilities may be helpful in reaching out to community members who are hesitant to become more civically engaged.

Population health information

Extensive health data has not been collected for Hamtramck on its own. Rather, the Wayne County Health Department collects information for the county as a whole, with the exception of the City of Detroit, which has its own health department.[xxxvii] Given Hamtramck is in such close proximity to

Detroit and is more demographically and economically similar to Detroit than to Wayne County, we may use health data collected by the City of Detroit as an approximation of Hamtramck's health conditions.

Table 2 in the Appendix summarizes the estimated health conditions in Hamtramck using Detroit data. Measures of health in these cities appear much lower than the rest of Wayne County and the State of Michigan. For example, Hamtramck has less healthcare access due to cost, fewer people with a primary care provider, and less health care coverage among those aged 18-64 years old. Rates of diabetes and asthma are also higher in Detroit/Hamtramck than in the rest of Wayne County and the state. Hamtramck has a higher preterm birth rate than the rest of Michigan, and it has been increasing.[xxxviii] It also has a higher infant mortality rate than the rest of the state.[xxxix] In addition, there are 66 primary care physicians for every 100,000 people, lower than the state average of 80.[xl]

Low healthcare coverage rates in Hamtramck can be attributed to low income and/or immigration status. Income-eligible citizens in Michigan may receive government-funded coverage if they are 138% of the federal poverty level.[xli] However, there is a gap between those who are eligible for Medicare and Medicaid services, and those who cannot afford to purchase private insurance. Based on the incomes observed in Table 1, this is likely to be an access barrier for many Hamtramck residents. Immigration can also hinder access. The federal government offers Medicare and Medicaid services to those "lawfully present" immigrants who are not U.S. citizens, including legal permanent residents, asylum seekers, and refugees. However, even for qualified noncitizens, there may be a 5-year waiting period for services. [xlii]

The federal Children's Health Insurance Program (CHIP) covers children in income-eligible families. In Michigan, CHIP also covers low-income pregnant mothers.[xliii] The state only guarantees coverage for emergency services to immigrant children. Nonprofit organizations often fill in the gaps in service and coverage from publicly funded perinatal and pediatric care (see Community Engagement).

Environmental exposure

According to the Environmental Protection Agency, out of all Michigan's postal zip codes, Hamtramck has the 27th-highest amount of toxic exposure. The highest levels of toxic exposure in the state are in southwest Detroit due to a high concentration of industrial facilities. Hamtramck has been

impacted by these nearby factories, particularly with regards to lead emissions. Hamtramck is also exposed to air emissions from Detroit's incinerator, closed in 2019, as well as the GM Poletown plant.[xliv]

Most of Hamtramck is within a 2-mile radius of the U.S. Ecology hazardous waste facility. While the U.S. Ecology Detroit North plant does not store PCB contaminated materials, they do process them.[xlv] PCB wastes are stored at the U.S. Ecology Michigan site in Belleville, MI, which received federal approval for a change in landfill lining that would allow U.S. Ecology Michigan to "continue to develop its PCB capacity of 12 million cubic yards."[xlvi] This change will likely lead to increase in the amount of PCB waste processed for storage in the newly expanded Belleville facility, given that that "U.S. Ecology is the only commercial hazardous waste landfill in Michigan and the only landfill in EPA Region V with approval to accept PCB Contaminated wastes."[xlvii]

In 2017, the Coalition to Oppose the Expansion of U.S. Ecology requested independent soil sampling of the Georgia Street area, where the facility is located. The findings included soil samples in public spaces that contained 1.6-6.3 ppm of arsenic, almost 20 times the EPA safety limit in soil. Pace Analytical Services Inc., an environmental testing laboratory based in Minnesota, conducted the soil analysis. Groundwater monitoring reports from 2003, conducted by Midwest Analytical Services Inc. in Michigan did not detect heavy metals in groundwater, but did find 340-470 mg/L of sulfate.[xlviii]

Susceptibility of vulnerable groups to exposure

The integrity of the clay liner meant to protect the aquifer is not certain. It is not improbable that chemical contamination can reach groundwater sources and top soil. Ingestion of toxicants due to soil contamination can be a risk for children with frequent hand-to-mouth behaviors and those who grown their own food just blocks away from U.S. Ecology. Researchers have hypothesized that plants uptake PCBs through their root systems even in the presence of a clay barrier.[xlix] This leads to exposure via ingestion of food grown in areas where there does not appear to be a significant concentration in soil.

This particular immigrant population is vulnerable not only because of English proficiency gaps, but also due to the large number of families from agricultural backgrounds. Many individuals from Bangladesh and Yemen continue farming practices in their yards in Hamtramck, all near U.S. Ecology.

Urban farming has become common practice in this area for individuals to affordably feed their families, maintain cultural traditions, and supplement income through the sale of produce to restaurants.[l]

It is important to highlight U.S. Ecology's storage of arsenic, along with the discovery of this heavy metal in independent soil samples. Groundwater arsenic is a source of exposure around the world and is a leading cause of cancers and other chronic diseases in Bangladesh. Bengali immigrants are particularly concerned about this contaminant and the accumulation of exposure to arsenic over their lifetime. Plants can uptake arsenic from soil, making it a source of exposure from ingesting food grown on contaminated land.[li]

Exposure and health

Ample evidence links many of the hazardous chemicals that are processed or stored at U.S. Ecology, including heavy metals and PCBs, to adverse reproductive health outcomes. The volume of PCBs in industrial sites in Michigan, their classification as a persistent organic pollutant, and the vast array of toxic pathways make this chemical a major concern. Findings regarding PCB mechanisms of action are mixed. This is likely due to wide variety of congeners and the common occurrence of PCBs in chemical mixtures used in industrial facilities. However, environmental persistence and reproductive health risks posed by PCBs, even at low levels, are well documented in both animal and human studies.[lii]

For example, exposure to even low levels of estrogenic PCB congeners is associated with early pubarche in children, a known risk factor for breast cancer, childhood obesity, and polycystic ovary syndrome.[liii,liv ,lv,lvi] There is also a correlation between early menarche and social adversity later in life; behavioral research shows that early-maturing adolescent girls display more aggressive behavior, suffer more verbal and physical dating abuse, and have greater stress and depressive symptoms.[lvii,lviii ,lix] Some have proposed that PCBs furthermore suppress the limbic system, which results in reduced motivation for social behaviors and the induction of depressive-like symptoms.[lx] Furthermore, associations between PCB exposure and longer time-to-pregnancy have been found.[lxi,lxii]

Additional evidence details the carcinogenicity, neurotoxicity, and reproductive toxicity of heavy metals. Mercury and arsenic are stored and processed at U.S. Ecology Detroit North, both inducing

hormonal changes that affect the menstrual cycle, ovulation, and fertility.[lxiii] Mercury is associated with reproductive disturbances including stillbirth, spontaneous abortion, congenital malformations, infertility, and inhibition of ovulation.[lxiv] Current literature, including studies of human and animal biomarkers, suggests that these effects are mediated via epigenetic modification such as DNA methylation.[lxv]

The proposed increase in storage of chemical pollutants will involve an expected increase in delivery of chemicals to U.S. Ecology by truck, and subsequent noise and air pollution in the community. There is increasing evidence of associations between occupational noise exposure and adverse reproductive health outcomes including low birthweight, preterm birth, and small for gestational age.[lxvi] [lxvii] Mechanistic studies demonstrate potential biological pathways between excessive noise exposure and implantation failure, dysregulation of placentation, and a decrease in uterine blood flow.[lxviii] In addition, noise is known to increase stress levels, which in turn can have both acute and chronic effects on in utero and early life development.[lxix] Thus, this HIA will include more rigorous monitoring of noise levels, in addition to groundwater and soil, in the Hamtramck area.

Recommendations

Part 111 permit adjustments

The extent of U.S. Ecology's proposed expansion calls into question several aspects of the corporation's Part 111 permit that warrant more rigorous attention from MDEQ. First, we recommend delaying approval of U.S. Ecology's expansion until independent groundwater and soil testing results are formally conducted. In the absence of up-to-date groundwater monitoring tests, MDEQ must determine whether contaminants have reached aquifers and wells in the vicinity of U.S. Ecology, or can reach these groundwater sources in the future. In addition, the presence of arsenic in tested soil samples on Georgia Street indicates that heavy metals transported and stored to U.S. Ecology can be found in public spaces outside the facility. It is also important to note that MDEQ may deny or require greater isolation distances of proposed facilities in accordance with Michigan Administrative Rule 299.9603.[lxx]

Another avenue is to withdraw U.S. Ecology's Waiver for groundwater and soil monitoring. U.S. Ecology is seeking renewal of a waiver from the requirement for it to operate a groundwater monitoring

program and a soil monitoring program. A waiver is allowed if a qualified geologist or geotechnical engineer finds that there is no potential for migration of liquid to the uppermost aquifer during the active life and post-closure care period of the facility. However, recent independent soil testing results support the need for MDEQ to reinstate soil and water monitoring program requirements in U.S. Ecology's Part 111 permit. Furthermore, a letter from the Great Lakes Environmental Law Center (GLELC) to the Wayne County Commission Committee on Health and Human Services also argues that three in-ground hazardous waste treatment units should be technically reclassified as surface impoundments, which are subject to more rigorous compliance monitoring requirements.[lxxi]

The proposed increase in storage of chemical pollutants will involve an expected increase in delivery of chemicals to U.S. Ecology by truck. Thus, we recommend requiring U.S. Ecology to monitor ambient air quality and noise pollution that may arise from the process of treating hazardous chemicals. In addition to limiting the extent of the expansion, U.S. Ecology should keep track of noise and air pollution levels to understand exposures during the construction of new facilities and increased traffic to the area.

Consideration of cumulative risk

MDEQ does not currently consider the cumulative risk posed to community members when assessing permit requests from individual licensees. This is a major point of contention regarding the Part 111 permit waiver. Even if a licensee operates within the limits of a Part 111 permit, those operations can still compound adverse health consequences and environmental quality in a given locality. In Hamtramck, a city with one of the lowest incomes in the country in a county with the highest rates of asthma, residents feel that allowing a hazardous waste facility to expand in such close proximity to families and children is perceived to be particularly unjust.

A statute in Minnesota requires the consideration of "cumulative levels and effects of past and current environmental pollution from all sources on the environment and residents of the geographic area within which the facility's emissions are likely to be deposited." The law is specific to South Minneapolis, where residents were disproportionately likely to be exposed to pollution sources. Requirements for a location to receive cumulative impact assessment are based on demographic and health information,

distance from a designated EPA superfund site, and busy roads.[xxxi] We believe such a statute can be implemented in Hamtramck and other parts of Detroit to protect Michigan's vulnerable populations.

Community empowerment and participation

The option to provide notices of a hearing and translation services at the public hearing into Arabic and Bengali is a recent development.[lxxii] The March 28 public hearing, called for by community members and organizations, took place only 15 days before closing the public comment period. This limited the time residents had to do follow-up research and submit comment. MDEQ also offered to give translations of the full hearing online, rather than in person at the time of the hearing. Less than 80% of homes have a computer, and less than 60% have a broadband internet connection.[lxxiii] Certified translators for languages of need should be present at all future community hearings.

This process has highlighted equity issues with MDEQ's approach to community engagement. Our final recommendation is to legislate the inclusion of community members in an organized dialogue, such as a citizen panel or a deliberative forum, to include stakeholders, elected officials, advocates, and demographically representative community members in the permitting process for hazardous waste facilities.[lxxiv] A mechanism of this sort that is legally mandated provides a way for public officials to gauge the opinion of members of the public on a divisive, technical, and political issue. Such a law can create forums for more deliberate public education and citizen engagement, so members of the public are better informed about hazardous waste facilities and risks they pose. In this way, citizen participation in decision-making not only sparks a shift in power, but also shifts the burden of proof to industries to show the extent of risk and safety of a hazardous waste facility near residents.[lxxv]

Monitoring and evaluation

Fundamental to any HIA are the principles of democracy and equity.[lxxvi] As such, democracy and equity must be the foundation for monitoring and evaluation of any HIA. In addition to the above recommendations, we suggest legislating of monitoring and evaluation measures that can address equity impacts over time.[lxxvii] We suggest an accountability mechanism aimed at addressing any adverse health impacts discovered in the monitoring process.[lxxviii] Finally, we will discuss who is responsible should

negative health and equity impacts be found, and discuss a mechanism by which these decision makers should create an improvement plan and report it back to the community.[lxxix]

Given U.S. Ecology Detroit North continues its operations, whether or not it expands, appropriate monitoring measures must be implemented. For example, short-term monitoring measures include annulment of the facility's waivers for water and soil testing (i.e., commencement of monitoring by MDEQ) in addition to public release of these water and soil test results. Longer-term monitoring should involve supervision of MDEQ's testing of U.S. Ecology Detroit North outputs by a community partner such as Coalition to Oppose the Expansion of U.S. Ecology. A further long-term priority should be measuring long-term changes in PCB concentrations in the Detroit River and analyzing this data for any associations with improved or stricter monitoring of U.S. Ecology Detroit North.

Given U.S. Ecology Detroit North expansion, appropriate monitoring would additionally include traffic noise levels tracking, new traffic routes of trucks delivering wastes, and inspection of containment facilities and their structural soundness. To address health and equity, these monitoring strategies can be compounded with further monitoring mechanisms. For example, the effects of increased or decreased noise levels from trucks effects on reproductive health components mentioned previously as well as the changes in PCB levels in garden plants in Yemeni and Bengali neighborhoods should both be monitored.[lxxx]

Furthermore, the levels of contaminants such as PCBs and heavy metals in groundwater near the facility should be measured and compared to levels deemed safe to be in drinking water, below those which have been found to cause adverse reproductive health outcomes and ideally using levels established using the precautionary principle.[lxxxi] Assessing the cumulative exposures to environmental hazards in the Hamtramck neighborhood should provide even more insight into the equity of health impacts of U.S. Ecology Detroit North. Additionally, monitoring the change in socioeconomic status of the Hamtramck community with emigration away from the facility by those who can afford it and how this affects exposures to other types of pollutants, which have been shown to disproportionately affect lower

socioeconomic communities in Detroit, will give insight into how this HIA and the U.S. Ecology Detroit North facility are affecting the health and health equity of the surrounding community.[lxxxii]

To maintain accountability for addressing adverse impacts arising during monitoring, we suggest the involvement of a community partner such as the Coalition to Oppose the Expansion of U.S. Ecology in the monitoring process. This partner can help hold MDEQ accountable with regards delivery of information in different languages languages (e.g., English, Arabic, Bengali, etc.) and help to disseminate it. This will help the community mobilize in the event of noncompliance. The MDEQ should be held responsible for defining and implementing violation fees and threshold levels for violations, and should release this information publicly. The MDEQ should hold itself responsible for ensuring health equity for the residents of Hamtramck living near the facility, with a community partner acting as a watchdog to hold the MDEQ accountable.

Finally, we recommend that U.S. Ecology provide funds for the recommendations above in order to reduce the costs to the state. As a national corporation, U.S. Ecology earned $504 million in revenue during the year 2017, a 6% growth from the previous year.[lxxxiii] The company is in the financial position to take more rigorous safety measures in its hazardous waste handling in such close proximity to residents.

Conclusion

We believe that the risk to the residents of Hamtramck through the expansion of U.S. Ecology is high and the permit should not be issued without intentional planning for monitoring to ensure that the history of violations does not continue. Expansion of this site should not be done without an eye toward the protection of the population from increased risk. Especially given the history of violations, the community surrounding U.S. Ecology should not be responsible for protecting themselves; MDEQ and U.S. Ecology must take the lead on protecting Hamtramck's residents through proper regulatory and monitoring action. MDEQ and U.S. Ecology must take the lead on protecting Hamtramck's residents through proper regulatory and monitoring action, using community partners to engage the public and allow their input to inform U.S. Ecology's Part 111 permit renewal, and the permitting of other hazardous waste facilities in Michigan.

Appendix

Table 1

Demographic	Hamtramck	Detroit	Wayne County	State of Michigan
Total population	21,985	672,829	1,750,000	9,900,000
Median Age	28.3	34	37.8	39.7
Age and Gender Distribution*				
Under 5	9.30%	7.30%	6.60%	5.80%
Under 18	32.20%	25.20%	23.70%	21.80%
65 +	8.30%	13.10%	15.10%	16.70%
Female	49.10%	52.70%	51.90%	50.80%
Male	50.90%	47.30%	48.10%	49.20%
Race/ethnicity **				
White	53.60%	10.20%	49.60%	75.30%
Asian	24.40%	1.80%	3.10%	2.90%
Black	14.70%	78.70%	38.60%	13.60%
Two or more races	4.47%	1.50%	2.40%	2.60%
Hispanic	1.44%	7.00%	5.80%	4.90%
Global Heritage in Order of Population ***				
1	Yemen	Mexico	Mexico	Mexico
2	Bangladesh	India	India	India
3	Bosnia and Herzegovina	Iraq	Iraq	Iraq
Number of Non-English speaking	13,100	66,840	220,633	859,731
Number of Arabic speakers	5,113	8,678	71,107	122,318
Number of Other Indic language speakers	4,203	4,299	12,629	30,522
No. of Serbo-Croatian language speakers	1,260	51	2,443	13,829
Non-English speaking Rate	64.60%	9.93%	12.61%	8.68%
Rate of Arabic speakers	23.10%	1.30%	4.00%	1.20%
Rate of Other Indic language speakers	19.00%	0.60%	0.70%	0.30%
Rate of Serbo-Croatian language speakers	5.70%	0.01%	0.10%	0.10%
Foreign Born*	42.30%	5.80%	8.70%	6.60%
U.S. Citizenship	77.3%	96.9%	96.3%	96.5%
2016 GINI index for income inequality******	0.566	0.485	0.485	0.485
Median Household Income	$ 23,609	$ 28,099	$ 43,464	$ 52,492
Average salary by gender***				
Male	$ 74,435	$ 63,533	$ 63,533	$ 63,533
Female	$ 67,382	$ 46,636	$ 46,636	$ 46,636
Number of employees	6,486	239,033	737,706	4,420,000
Employment Rate	8.71%	35.53%	42.15%	44.65%
Median property value	$ 47,300	$ 43,500	$ 105,300	$ 147,100
Persons in Poverty*	50.90%	37.90%	22.60%	14.20%
Number of residents living in poverty by race or ethnicity				
White	5,350	30,289	132,859	916,691
Asian	2,849	N/A	14,130	377,577
Black or African American	1,683	187,616	219,006	111,195
Share of poverty by race/ethnicity				
White	53.00%	12.60%	33.00%	61.30%
Asian	28.20%	N/A	3.50%	3.10%
Black or African American	16.70%	78.10%	54.40%	25.30%

* Data is from Census estimates. All other data is from Data USA.

** Census data does not capture demographics of individuals of Middle Eastern origin. Rather, individuals who identify as Middle Eastern and North African (MENA) must elect "White" as their racial category on the Census. Bengalis, who are not Arab, but from a predominantly Muslim area of Southeast Asia, may also be incorporated into the broader 'Asian' category on the U.S. Census.

*** The closest comparable data for the census place of Hamtramck, MI is from the public use microdata area of I-94 Corridor PUMA, MI. The closest comparable data for Wayne County and Detroit is from the state of Michigan.

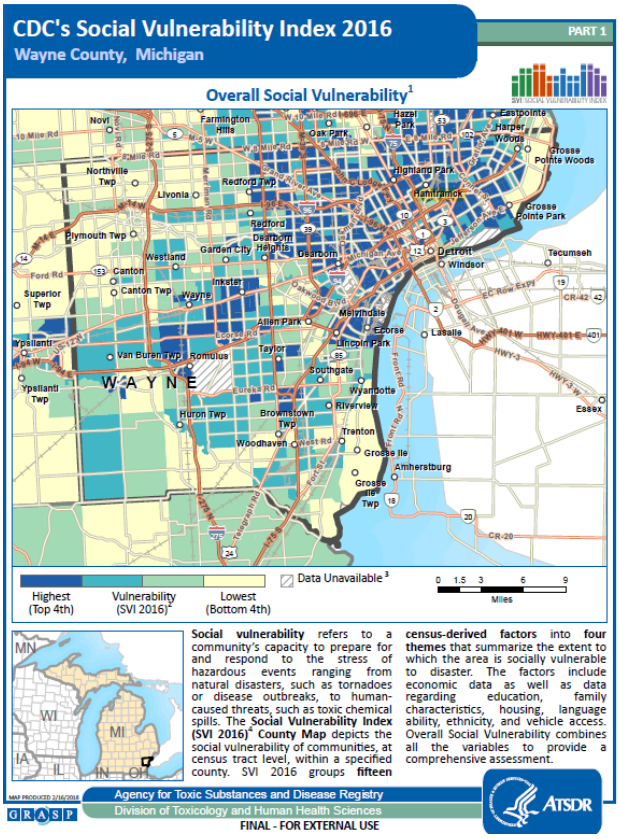
**** The 2016 GINI for I-94 Corridor PUMA, MI is higher than the national average of 0.485. In other words, wages are distributed less evenly in I-94 Corridor PUMA, MI in comparison to the national average. The closest comparable data for Wayne County and Detroit is from the state of Michigan. The GINI for the state of Michigan is the same as the national average of 0.485, meaning wages are distributed approximately the same as the national average.

Table 2

Condition	Michigan	Wayne exc. Detroit*	City of Detroit
General Health, Fair or Poor	17.5%	18.2%	27.5%
Physical Health			
Poor Physical Health on at least 14 days in the past month	16.3%	16.9%	18.5%
Activity Limitation on at Least 14 Days in the Past Month	9.2%	8.7%	13.5%
Disability	25.6%	27.5%	30.8%
Weight Status: Obese	31.4%	31.5%	37.2%
Weight Status: Overweight	35.0%	33.6%	33.2%
Weight Status: Healthy	31.9%	32.7%	27.5%
No Leisure Time Physical Activity	24.9%	25.1%	34.7%
Mental Health			
Depression	20.7%	20.2%	21.1%
Poor Mental Health on at Least 14 Days in the Past Month	16.2	16.8%	18.8%
Health Care Access			
No Health Care Coverage Among Those Aged 18-64 Years	11.5%	12.7%	17.2%
No Routine Checkup in Past Year	27.7%	26.0%	24.3%
No Personal Health Care Provider	15.2%	12.8%	23.0%
No Health Care Access During Past 12 Months Due to Cost	13.3%	12.9%	21.3%
No Dental Visit in Past Year	30.7%	29.6%	49.6%
6+ Teeth Missing	15.7%	10.9%	25.0%
Cigarette Smoking			
Current	20.8%	21.9%	32.8%
Former	26.2%	27.5%	18.1%
Never	53.0%	50.6%	49.1%
Disease Status			
Asthma: Ever Told Have Asthma	15.8%	15.3%	20.9%
Asthma: Still Have Asthma	10.7%	7.3%	14.7%
Ever Told COPD, Emphysema or Chronic Bronchitis	8.5%	8.9%	12.3%
Heart Attack	4.9%	3.0%	5.5%
Ever Told Angina or Coronary Heart Disease	5.0%	4.9%	4.6%
Ever Told Stroke	3.4%	3.6%	6.0%
Ever Told Any Cardiovascular Disease	9.7%	10.2%	11.4%
Ever Told Cancer	12.3%	13.5%	6.9%
Diabetes	10.8%	11.3%	13.1%
Kidney Disease	3.5%	3.7%	4.2%

*Hamtramck is located in Wayne County, but it is not part of the city of Detroit. Its data is therefore included in this category.

Figure 1


CDC's Social Vulnerability Index 2016
Wayne County, Michigan
PART 1
Overall Social Vulnerability[1]
Highest (Top 4th)
Vulnerability (SVI 2016)[2]
Lowest (Bottom 4th)
Data Unavailable[3]
Miles
Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. The Social Vulnerability Index (SVI 2016)[4] County Map depicts the social vulnerability of communities, at census tract level, within a specified county. SVI 2016 groups fifteen census-derived factors into four themes that summarize the extent to which the area is socially vulnerable to disaster. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. Overall Social Vulnerability combines all the variables to provide a comprehensive assessment.
Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
ATSDR
GRASP
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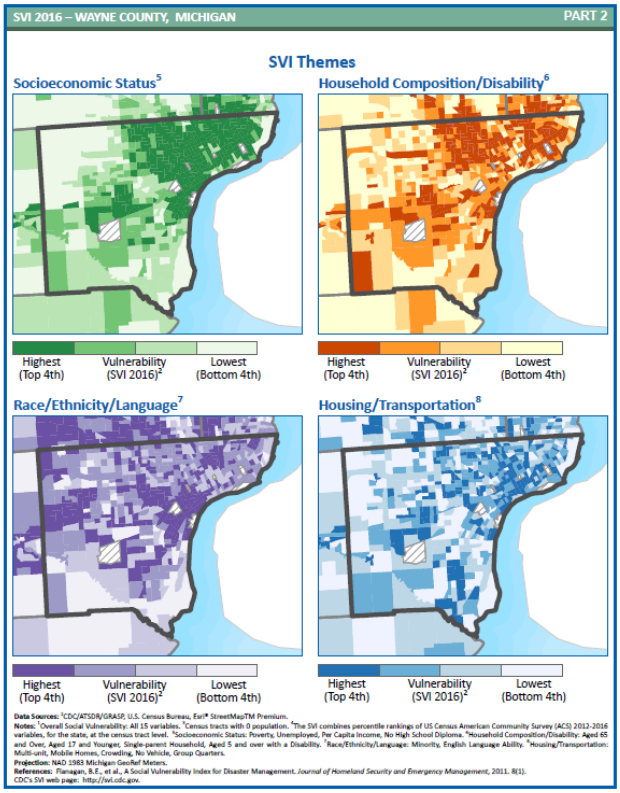
SVI 2016 – WAYNE COUNTY, MICHIGAN
PART 2
SVI Themes
Socioeconomic Status[5]
Household Composition/Disability[6]
Race/Ethnicity/Language[7]
Housing/Transportation[8]
Highest (Top 4th)
Vulnerability (SVI 2016)[2]
Lowest (Bottom 4th)
Data Sources: [1]CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMapTM Premium.
Notes: [1]Overall Social Vulnerability: All 15 variables. [2]Census tracts with 0 population. [3]The SVI combines percentile rankings of US Census American Community Survey (ACS) 2012-2016 variables, for the state, at the census tract level. [5]Socioeconomic Status: Poverty, Unemployed, Per Capita Income, No High School Diploma. [6]Household Composition/Disability: Aged 65 and Over, Aged 17 and Younger, Single-parent Household, Aged 5 and over with a Disability. [7]Race/Ethnicity/Language: Minority, English Language Ability. [8]Housing/Transportation: Multi-unit, Mobile Homes, Crowding, No Vehicle, Group Quarters.
Projection: NAD 1983 Michigan GeoRef Meters.
References: Flanagan, B.E., et al., A Social Vulnerability Index for Disaster Management. Journal of Homeland Security and Emergency Management, 2011. 8(1).
CDC's SVI web page: http://svi.cdc.gov.
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Author contributions

Lauren researched demographic and health information for Hamtramck and built the tables that demonstrated the differences between Hamtramck and the state of Michigan. She examined the ways that the chemicals of interest affected the vulnerable populations specifically. Finally, she introduced the HIA in the context of the selected frameworks. For the in-class presentation, Lauren was responsible for writing the demography and health slides, as well as writing and presenting the appeal to MDEQ slides.

Erin researched the information regarding the background of US Ecology Detroit North's current application for relicensing and the MDEQ's role and responsibility in this process. She also explored the reprotoxic effects of various chemicals stored in the US Ecology Detroit North facility. Finally, she explored mechanisms for monitoring and evaluation of the HIA recommendations. For the in-class presentation, Erin was responsible for the appeal to US Ecology to adhere to the recommendations proposed in our HIA.

Farah researched Hamtramck historical information, the demographic information and health information that were included in Lauren's tables, and social vulnerability measures. She wrote recommendations, and requested information from the Coalition to Oppose the Expansion of U.S. Ecology obtained through a FOIA request so we could have more substantive details about the company's plans. Farah also provided references for studies of reproductive toxicity of chemicals and included results from independent soil tests found in the FOIA documents. For the in-class presentation, Farah was responsible for providing the community's perspective of the expansion.