A Breath of Fresh Air

An impact assessment study of the health and economic costs of pollution in South West Detroit 48127.

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2. Introduction

The main objective of this study is to research existing knowledge and evidence about the impact of pollution on citizen's health in SW Detroit 48217zipcode. The results will highlight the social, economic and health problems from the perspective of the residence. In partnership with the Detroit Sierra club Detroit, and Detroit Detroiters Working for Environmental Justice. A tour of the area was arranges and the students participated in a toxic tour coordinated by the Detroit Sierra club.

Due to financial and time constraints, this study does not involve generation of original scientific knowledge. The study will use existing research data to create data visualization and infographics of the findings to illustrate the opportunities and challenges to a more diverse audience. Links to the online Infographics will be provided at the end of the project summary report.

3. Overview of 43217

Upon entering Detroit, 48217, from the west, you will encounter the tribute basketball that was painted to honor our Pistons Basketball team winning the 2004 NBA championship. What you do not realize is that it is painted on a Marathon gas tank. Beyond this tribute lie numerous power plants, processing plants, and factories that are contributors to the toxicity of the area code 48217. Great quantities of toxic pollutants are emitted into the environment from these plants. Residents who live in this area can see the plants from the comfort of their own porches. Along with this view come many health concerns and issues. The entire city

of Detroit has a low per capita income than most US cities, and the zip code 48217 is worse than the norm.

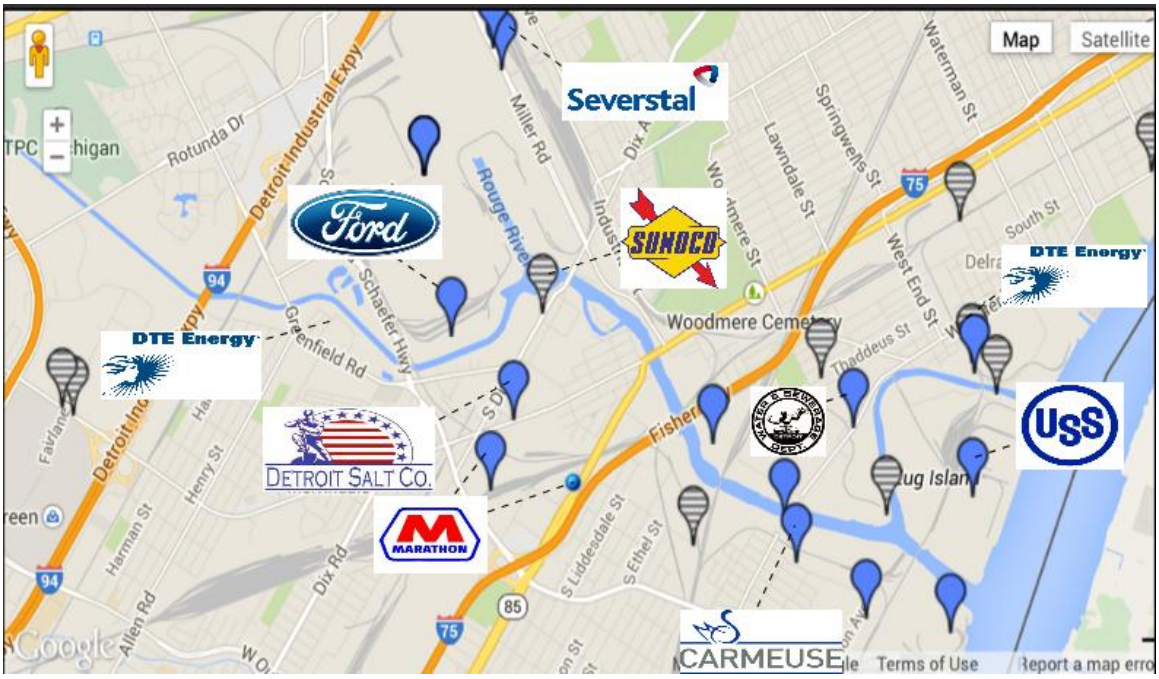

Figure 1 : Map of 48217 Industry.

The ZIP code 48217 is a small part of Detroit that is bordered by I-75 and the Rouge River. The population in this area is approximately 8,200 people (Atkin, 2014). Of the population, 46.98 percent is male and 53.02 percent is female ("Detroit, MI 48217 Population Growth," 2012). The majority of the population falls in the age range of 35-54 years old. 12.44 percent of the population is between the ages of 35-44 and 14.04 percent of the population between the ages of 45-54 ("Detroit, MI 48217 Population by Age," 2012). More than 84 percent of the residents are African-American (Atkin, 2014). Other ethnicities in this area are Hispanic, White, American Indian and Alaska Native, Asian, Native Hawaiian and

Other Pacific Islander, and other (Detroit, MI 48217 Population by Race and Ethnicity," 2012).

The residents cannot afford to move to escape the harmful effects being posed on them by pollution. Included in these harmful effects are immune dysfunction, asthmatic episodes, respiratory failure, and rising cases of cancer. Another major concern that this pollution sparks is the health and safety of children in this area. Although there are regulatory standards in place for industry emissions, unfortunately, there is a lack of environmental standards in regards to pollutants near school grounds. Through all of this smoke, we are trying to find a breath of fresh air. This report will provide a summary of the causes of Detroit pollution and link to the adverse health effect of the people of Detroit.

4. Impact of Industry on Detroit's Toxicity

The zip code of 48217 has been labeled as one of the top most toxic cities in America, let alone the most toxic zip code in all of Michigan. The toxicity is causing problems health wise and living wise. Southwest Detroit has become a very industrialized community and it is a huge problem. The industrial plants in the area are causing all sorts of sicknesses and diseases for its residents. There have been reports of falling dust over this part of the city that contains unusually high levels of lead. The high levels of lead found in this dust are produced by the factories and have been known to very harmful and potentially deadly.

Figure 2 : Industry located next to a school

Residents are able to see some of the steel plants from their porches. Many in the city's neighborhoods describe the air's scent to be so polluted that they can't even stand to sit on their porches because they live within hundreds of feet of the industrial plants and I-75. With the high toxicity of the pollutants being emitted

from the factories and the residents living in such close proximity, it becomes easy to see how they are beginning to develop diseases associated with lung damage.

There are several industrial plants located in Southwest Detroit 48217 zip code that are big contributors to this issue. These plants began to populate this area in the 1950's with magnificent growth over the years (Newell, 2013). They have caused several health complications such as respiratory/nervous system disorders, heart problems, and various types of cancer. The waste from the plants was not intended to harm the community. According to scorecard.goodguide.com, a few of the plants that add to the pollution in the area are:

- DTE coal plant
- Marathon oil refinery
- Severstal steel
- U.S. Steel
- U.S. Gysum
- Detroit Water Waste Plant

Over a million pounds of hazardous chemicals are released in to the community each year (Atkin 2014). There are multiple chemical toxins that are released from these plants such as benzene, sulfur dioxide, hydrogen sulfide, hydrogen cyanide, and several others. Benzene is a known carcinogen and is emitted by several industries in the 48217 zip code. Benzene can cause developmental problems including growth, structural, and/or functional abnormalities. It can also have adverse hematological affects, altering blood composition, clotting function and production, as well as possible changes in red blood cell production and

function. Benzene can be responsible for immunological abnormalities such as changes in the function of white blood cells, lymph nodes, spleen, tonsils, and/or thymus. Reproductive issues may arise such as a decreased ability to conceive or carry pregnancy to term (Toxic Release Inventory (TRI) Program, 2014).

Sulfur dioxide may cause respiratory problems such as bronchoconstriction and increased asthma symptoms. Those especially at risk for adverse effects are children, elderly, and asthma sufferers. Exposure to sulfur dioxide can lead to increased emergency room visits and hospital stays

Hydrogen sulfide is not known to cause cancer, however, neurological issues such as impaired sensory and motor signaling may occur. Hydrogen sulfide can also affect the respiratory system causing inflammation of lungs and airways and/or changes in breathing rate. Carbon-oxygen exchange may become insufficient and possibly lead to respiratory failure. (Toxic Release Inventory (TRI) Program, 2014)

N-hexane is an emission that may lead to negative neurological effects, causing impairments to sensory and motor signaling. (Toxic Release Inventory (TRI) Program, 2014)

Hydrogen cyanide may adversely affect the endocrine system causing changes to gland/hormone production, secretion, transport, or signaling. Hematological effects consist of altered blood composition, blood clotting, and blood cell production/function. Neurologically, hydrogen cyanide can lead to impaired sensory and motor signaling; and reproductive functions may be hindered as well. (Toxic Release Inventory (TRI) Program, 2014)

Exposure to xylene may cause birth weights to be adversely affected. Neurological changes may occur as well as ocular issues such as eye irritation, itching, and/or impaired vision. Respiratory effects include inflammation of lungs and airways, as well as changes to breathing rate and lung function.

Aluminum fume or dust and manganese compounds may cause neurological impairments and zinc compounds may have adverse hematological and reproductive effects.

Toluene emissions may cause neurological impairments as well as eye irritation and impairment. Toluene may also result in renal issues such as blood in urine, decreased kidney efficiency, and changes in blood pressure. As with most toxic emission, lung and airway inflammation may occur leading to changes in breathing rate, and negative respiratory function.

These are only *some* of the more than 1.6 million pounds (Atkin, 2014) of toxic emissions per year that residents of the 48217 zip code are facing. It doesn't seem that schools in this zip code are safeguarded from these emissions or that there is a minimum distance policy stating how far schools need to be from these toxic emissions. Children are more vulnerable than adults to pollution. With at least three schools in the area as well as playing fields, these emissions are a major concern.

5. Economic impact of Pollution on Housing

The toxicity of the area that is causing this housing crisis makes it difficult for not only people to move out of the polluted areas in the city, but makes it unenticing for people to want to move into these areas. According to the real estate search engine, CLRSearch.com, there are only 2,270 owner occupied units in the 48217 area. In this area of Detroit, 52.91 percent of homeowners are without a mortgage in comparison to only 29.44 percent of people without a mortgage in the state of Michigan (“). This statistic shows that homeowners have invested in their homes by paying off their mortgage and retaining ownership. Although the vast majority of households, 75.23 percent, moved in from 1999 or later, the second largest wave of home occupancy, 17.74 percent, was in 1969 or earlier (“ ,” 2012). The people who have been living in these homes have been members of the community for decades. Due to either their long-term residency or their paid off homes, they may not be in a position to move out. Additionally, the housing market in the 48217 zip code is far from ideal for current owners looking to sell their homes. While home values in the United States have had their ups and downs in the last decade, in this area of Detroit housing values have yet to recover. The median value of owner households in the 48217 area is $61,117. The state of Michigan median household value stands at $174,467, which is nearly three times as much as homes in the 48217 zip code (“ ,” 2012).

6. Income Disparities

The financial prospects and outlook of this area are bleak due to the lack of high paying employment. The average household income for the 48217 regions is $54,706 per year in comparison to the average income of $68,163 for the state of Michigan (

Due to the disparity of income between this population and the rest of the state and country, many opportunities for improvement are denied to this group of individuals (Atkin, 2014). In fact, the largest percentage of residents in this area of Detroit is in the lowest range, earning less than $15,000 a year (Atkin, 2014). Members of the community lack a sufficient income and possibilities for job advancement and employment as well.

Along with the pollution in this area, which has caused a numerous amount of sickness such as laryngitis, cancer, and asthma, there comes another problem with the residents affected. Environmental racism is another big point being highlighted by the residence. Organizing to fight pollution is disproportionately low-come community is likely to fail because of the lack of internet access, leaving most of the residents uninformed and make them no longer passionate about the community's best interest. The lack of a viable communication outlet is a serious consideration. Due to the high volume of industry, there are serious concerns about evacuation after an industrial accident.

7. Impact of Pollution on Residence Health

Emission from the plants and surrounding freeways leave those who have been exposed for years with a number of illnesses and complications affecting children such as infant mortality, DNA damage, and respiratory diseases including asthma, respiratory infections, allergies, and reduced lung function growth (“Diesel Pollution,” n.d.).

The largest apparent problem among the youth in the city is asthma, which affects roughly 29% of the population which is almost three times the national average. The rate of asthma hospitalizations with children is four times greater than the target rate ("Detroit Asthma Statistics," n.d.). Residents of the city say that almost all children have asthma and those who do not usually have other respiratory diseases, among other things.

Not only does Wayne County have the highest number of pediatric asthma cases, but it also has the highest state population living in poverty which the zip code of 48217 greatly contributes to. The children in the city are suffering from respiratory complications that commonl arise near the time of birth.

Asthma is currently the leading cause of school absences and preventable hospitalizations for children younger than 18 according to a report by the Michigan Department of Community Health and the Centers of Disease Control and Prevention (Taylor, n.d.). Other concerns are that many residents fear planting in the yards because they believe that their soil is contaminated. The soil around homes and schools have tested positive for lead and other contaminations. This

posses threats to the environment because many of the pollutants in the soil become runoff and are evaporated into the atmosphere.

The state of Michigan lacks policies regarding pollutants and environmental standards near school grounds. Research has found that schools in the highest pollution areas tend to have the lowest attendance rates. This is a clear indicator of poor health, as mentioned earlier with city having asthma as the leading cause of school absenteeism. These schools also tend to have the highest proportions of students who failed to meet state educational testing standards. It is clear that the high polution in the area is not only affecting the health of the children, but also their education and furthermore, their social economic standing in later years to come ("Air Pollution, Academic Performance", 2014).

Along with 48217 containing high rates of lung and bronchus cancers, three zip codes surrounding it have significantly higher rates. There are constant odors, sickness, and clouds of dark particles that surround this area, which are a result of a high-carbon, high-sulfur byproduct called petcoke (Atkin, 2014). Petcoke is included with what the individuals are inhaling, which may later cause the health problems in this community (Atkin, 2014). Rates are only increasing with the health concerns and residents speak of stories they have experienced, which only shows the worst of 48217.

A current resident, Theresa Landrum, is a cancer survivor and activist that stated her story and thoughts of this toxic zip code in the *Detroit Free Press* (2010). The diseases that have been diagnosed in nearly every household are asthma, leukemia, sarcoidosis, and multiple other cancers. A close neighbor of Landrum's

has four children with asthma and a father, who has passed away last year from cancer. The chemicals that are inhaled daily are so toxic to the body's organs and will only increase diseases. She mentions that she is a cancer survivor and that both of her parents died from cancer, whom also lived in this zip code. Landrum, while undergoing chemotherapy, wanted to show the Detroit City Council that the pollution that is in the air daily from the industries is effecting the health of those living in the area. The Marathon Refinery is expanding, which will only give a wider range for health problems to occur. These residents still consider this toxic area home, but each neighbor knows the health problems each house is experiencing (Landrum, 2010).

The above examples are not only residents' opinions and experiences while living in this polluted zip code, but evidence shows that this is a toxic area. According to the Population Health Council, "In 2010, there were more than 130,509 hospital discharges among Detroit residents. More than one in four (25.6%) hospital discharges were classified as ambulatory (walking) care sensitive conditions (Lewis & Mason, 2010, p. 7)." In 2010, Detroit's total ACS hospitalizations for the residents were 3,498 out of 33,451 were admitted for asthma (Lewis & Mason, 2013).

In addition, sarcoidosis is a condition that plagues the 48217 zip code. Sarcoidosis is a disease typically caused by an unspecified source that causes inflammation within the body (Sarcoidosis - American Lung Association, n.d.). In a regular immune system, when a foreign invader has been identified, cells are sent to destroy said invader. This causes an inflammatory response within the body. In a person with sarcoidosis, the inflammation does not go away. Instead, the cells

clump together and form lumps called granulomas, on or within the organs of the body (Sarcoidosis - American Lung Association, n.d.).

Sarcoidosis presents itself with a variety of signs and symptoms including: wheezing, cough, shortness of breath, weight loss, joint and bone pain, skin lesions, anemia and many more. On a more serious note, sarcoidosis can also affect the heart and brain, causing detrimental and fatal effects on the body (Sarcoidosis - American Lung Association, n.d.). Because sarcoidosis causes granulomas anywhere within the body, virtually any organ or tissue can be affected and symptoms may appear. These life-altering symptoms caused by sarcoidosis are highly noted within the Oakwood Heights neighborhood and causing immense suffering of the citizens living within this zip code.

Because research relating to sarcoidosis is rather new and underdeveloped, the cause has not yet been nailed down. However, it is likely that geographic location plays a large role in the advancement of this disease (Baughman, Culver, Judson, 2011). As research of sarcoidosis continues to grow, hopefully the knowledge of how to treat and provide therapy for the growing number of people within the 48217 zip code, who have contracted sarcoidosis does as well. For now, treatment focuses solely on management of symptoms such as oxygen for shortness of breath and wheezing. Many forms of steroids such as topical and injections have also been helpful in treatment and maintenance of sarcoidosis (Baughman, Culver, Judson, 2011).

Even though 48217 is considered home to most of the residents, their daily lives are constantly in danger from the inhalation of chemicals from the salt mining,

steel production, crude oil refining, tar sands, and coal burning industries that enclose and pollute this neighborhood (Atkin, 2014).

8. Conclusion and Recommendations

Research has revealed that there are significant health problems being seen in residence of 48217. Although Asthma is the primary concern for residence. Emission from the plants and surrounding freeways leave those who have been exposed for years with a number of illnesses and complications affecting children such as infant mortality, DNA damage, and respiratory infections, allergies, and reduced lung function growth The impact on children's health is extremely concerning with the number of absenteeism significantly higher that other areas in Detroit. The poor health has an adverse impact on job seekers who find it difficult to balance the work commitments and hospital visits. Parents are also experiencing challenges managing the health of the children and work. The distance to medical facilities further exasperates the health problems.

A recommendation would be to create a SMS based warning system that would broadcast a message to residence and schools informing them to keep inside when there are high cumulative levels of chemicals in the air. This may prevent some of the high numbers of asthma hospitalizations.

Another challenge is the lack of libraries or public gathering spaces with Internet access to provide residence with opportunities to seek jobs, and prepare resumes. Previously the Allied Media projects, has worked residence establish a Mesh Network. This is a low cost way for multiple residences in 48217 to share one

central Internet connection. The outcome of this new growing network initially made it easy for users to share information with their neighbors and made life a little beneficial for residents in this area. The problem with this approach is that residence become suspicion of being hacked, and close down the Internet connection to protect them. A recommendation would be the creation of a mobile unit similar to project that provided Internet and computing capabilities 2 times a week to the areas. The mobile unit would also reduce the potential risk for staff volunteers to pollution as it negates the need for continuous presence in the area. The digital divide exists in Detroit and is a contributor to the poverty being faced in the area. Families who lack online access don't have the needed tools to improve their skills, education, employment and business opportunities.

Lack of access to high spend Internet is equivalent to not having a utility. Internet is as important to our lives as electricity, gas and water. Another aspect of deep concern for the residence is the lack of accessible healthcare providers in the area. There is a view that providing access to Nurse Practitioners locally could help managed some of the chronic conditions faced by the residence related to the pollution.

An important consideration for the plants is to focus some of the outreach activities on economic regeneration. Current outreach involves creating green zones and community centers. These are welcome by the residence, however initiatives that provide skills training, business opportunities and educational opportunities would have a more profound impact on community.

9. Infographics

The following infographics can be viewed online using the link provided.

Infographics Heading	Please click on the link to view full Infographic
	https://magic.piktochart.com/output/3657404-team-swd-tuesday-1-4pm
	https://magic.piktochart.com/output/3349172-front-class-infographic
	https://magic.piktochart.com/output/3544912-mis-3350-4-6pm-back-row#
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