Differences Between Scientific Experts and Residents of a Community in Columbus, OH in Perceptions of Brownfield Sites and Their Effects on Health

Masters Thesis

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By
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Abstract

Brownfield sites, defined by the U.S. EPA as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant," are a problem in many urban areas. In addition to potential chemical hazards, they pose other experiential and physical hazards to the communities in which they exist. This community-based participatory research study examined the differences between residents of Weinland Park, a community in Columbus, Ohio and experts in environmental science about their perceptions of hazards, health impacts, necessary actions and methods of seeking information as they pertain to brownfields. Results suggested a need for comprehensive risk communication to build a common language between these lay and expert populations. While residents knew there were contaminated sites in their neighborhood, many did not know the term brownfields. Experts showed a greater familiarity with chemical hazards than residents, but both groups had similar perceptions of experiential and physical hazards. Both groups suggested that poverty can increase a population's vulnerability to health effects from brownfield sites due to prolonged exposure to chemicals and delayed action. Experts outlined process-based methods of communication including a community-based method called "porch chats." Both groups
identified a need for partnership between community and government entities to elicit effective action in brownfield redevelopment.
Dedication

This is dedicated to my friends and family, whose support has helped me to achieve success in my education.
Acknowledgments

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May 2004 ............................................. Las Cruces High School

2009.......................................................... B.A. Biology, New Mexico State University

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2010 to present ........................................ Graduate Research Associate, College of

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Fields of Study

Major Field: Public Health
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Chapter 1: Introduction and Background

Brownfields as a Public Health Problem

Urban environmental exposures are often involuntary and those exposed are often not those who benefit the most from the sources of the exposure. Those who have these exposures are often unaware of them and do not have the option of distancing themselves by moving. Health effects from environmental exposures are numerous and among others can include endocrine disruption, cancer and reproductive effects. These communities of concern are often marginalized groups living in densely populated urban areas who may not be aware of how to seek information. In addition, due to historical contexts with research and marginalized populations, they may mistrust the sources of the information they are given (Litt, Tran, & Burke, 2002). One common source of these exposures is brownfield sites, which are defined by the United States Environmental Protection Agency (U.S. EPA) as “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.” (US EPA, 2011)

Chemical waste from contaminated sites causing health problems in nearby communities is not a recent problem in the United States. Incidents like contamination at Love Canal in the 1970's led the public to have a more vocal presence in environmental law. The Resource Conservation and Recovery Act (RCRA) of 1972 introduced the
important concept of "cradle to grave" responsibility; those responsible for generation of a chemical are responsible for elimination of it as a hazard (US EPA, 2011). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, has regulated the cleanup of chemical spills and directed funds toward remediation of those sites most hazardous to the public since 1980 (US EPA, 2011). Some of these sites had lesser levels of contamination and did not get placed on the National Priorities List (NPL) for funding but for other reasons (e.g. fear of liability), redevelopment was complicated. These sites were seen as a different type of problem and as such needed special policies to guide the businesses taking them over and assist in their comprehension of liability for the chemical waste contained therein. In 1992, they became known as brownfields officially, a term that had previously been restricted to jargon, with creation of legislation specifically for these brownfield sites (US EPA, 2011). It was at that time that initiatives were taken to encourage the redevelopment of this land and ease the financial burden on redevelopers who may have previously been deterred from doing so (US EPA, 2011).

Redevelopment of brownfield land is becoming more common and as green space (unused land) becomes a more limited resource, it is nearly inevitable (Wernstedt, 2004). The environmental benefits of redeveloping brownfield sites include reusing land and removing hazardous waste. Additionally, there are numerous social and ethical benefits for redevelopers; lesser exposure to removed contaminants implies a lower risk for health effects among vulnerable populations and the development of new buildings can improve
the economies of these communities. In addition, the new buildings can reduce the level blight in affected communities as well (Wernstedt et al, 2004).

In spite of these benefits, the entry of new business into these communities is often difficult. Fear of liability from future residents who may develop health effects years down the road can prevent some entrepreneurs from wanting to turn the land into housing and the substantial cost of cleanup can prevent others from wanting to remove contaminants (Greenberg, 2003). To this end, there are numerous laws and policies in place to assist developers with the cost of cleanup and limit liability from Superfund legislation if the new owner of the property has remediated the land to EPA standards. This funding can come from the local, state and national governments as well as the developer's own funds (US EPA, 2011). An example of policy is the state of Ohio's Voluntary Action Program, which limits businesses' liability if they comply with EPA standards (“Ohio Voluntary Action Program (VAP),” 2011). The role of public health in management of brownfield sites involves an assessment for chemical contamination and management of chemical waste and long-term monitoring of the site and stewardship with the community. This monitoring has previously come in many forms and can include regular assessment of contaminant levels and monitoring of the health status of the communities (US EPA OSWER Office of Brownfields and Land Revitalization, 2011).
The EPA estimates that there are at least 450,000 brownfield sites in the United States (US EPA, 2011). Affected communities face the potential of chemical exposure, the presence of dilapidated buildings and suffer the economic hardship that comes as a downstream effect of having unused land and fear of entry into the community by potential redevelopers (Rowan & Fridgen, 2003). In addition to chemical hazards, these buildings can pose experiential hazards such as blight, crime, drug use, prostitution, and violence as well as physical hazards such as broken glass, falling from unstable building structures, and accidental fires. Information on the risk of negative health effects posed to residents by this chemical contamination is necessary, but until a thorough risk
assessment is conducted by environmental scientists, the only source of information to rely on is company records of which chemicals were used in industry, any documentation of how these chemicals were used and the amounts of chemicals remaining (US EPA, 2011).

While much of this information is available to the public at large, it may only be available in venues that are not easily or intuitively accessible to the lay population. Because it is often marginalized populations (e.g. communities of color, working-class, lesser educated) who live in the inner-city neighborhoods that contain brownfields sites, it may not be a fair assumption that these communities will seek information using the same channels that a scientist would (Rowan & Fridgen, 2003). Studies indicate that there is likely to be a gap between the channels through which expert populations and some marginalized communities seek information (Spink & Cole, 2001). Chemical hazards notwithstanding, communities of concern still have abandoned buildings which can act as an attractive nuisance. The lack of tax revenue from businesses that would otherwise be in operation on these sites could theoretically elicit a lack of action from government entities and worsen the existing economic problems in these communities (Rowan & Fridgen, 2003). These problems are likely to exist in many communities affected by brownfield sites, including Weinland Park, the community in which this study was conducted.
Description of the Community and Residents

Weinland Park is a community near the Ohio State University (OSU) with an area that covers roughly one third of a square mile and two census tracts. It is located east and southeast of OSU, is part of the “University District” and has been targeted by a number of OSU entities for community partnership. It is a historically working-class area and has within its boundaries an elementary school, a library, a community center, a settlement house, and numerous small businesses. Residents of Weinland Park face several challenges. Its population of approximately 5,000 individuals is comprised mainly of young people with 36% being 19 or younger and 33% between the ages of 20 and 29. Its population density is roughly three times that of the Columbus average; the majority of the community members are renters, with only 9% of residents owning houses. Additionally, 29% of Weinland Park residents are single mothers, 51% of the community is African American, and the community’s median household income of $15,381 is $25,566 less than Columbus’ median household income of $37,897 (Center for New Media and Promotions, 2011).

Though it is part of the University District, few OSU residents reside in Weinland Park (see Figure 2 for a map of Weinland Park). In fact, 38% of the community has yet to achieve a high school education, and less than one third have some college or a college degree. In addition to its other issues, the Weinland Park community faces several environmental health problems including brownfield sites, abundant litter and concerns about indoor air quality. Because many residents are limited in their ability to change their exposure status by moving to a different neighborhood, or may be unaware of their
current exposures, it is critical to understand how perception of these hazards plays a role in the actions residents take to protect their health. More specifically, understanding which aspects of brownfields residents find relevant to their risk, where they get information and how their attitudes and perceptions are similar or different from those of experts is critical. The purpose of our study was to facilitate understanding of this community-chosen environmental public health issue (brownfield sites) across these two potentially disparate populations (residents and experts) and to build a common language and more effective risk communication.

Figure 2. Map of Weinland Park Community (Campus Partners, 2004)
Description of Experts

Experts who participated in our study came from a variety of backgrounds of expertise and practice. People who are well-educated about environmental health, people who do redevelopment of brownfields, and people who work for the EPA are all experts. Additionally, researchers with an expertise in urban design, soil science, environmental science and other fields were recruited as experts. One critical difference between experts and residents was that experts did not reside in the Weinland Park community, ensuring that their perspective was that of an outsider to the community.

Brownfields in Weinland Park

There are up to five brownfield sites located within the Weinland Park community and two were chosen for the purposes of our study (for photographs of these sites, see Appendix C). One site is located on Grant Ave between 6th Ave and Chittenden and was formerly owned by the company Columbus Coated Fabrics. Its chemical contaminants included metals, semi-volatile organic compounds (SVOCs), and plasticizers such as phthalates. At the time of the study, it was under remediation and currently, having received a No Further Action (NFA) letter from the EPA (which states that the cleanup has been conducted to EPA standards), redevelopment on the land is currently in process. The other site is a former 3M site and is located on east 5th Ave. The main chemical contaminant of concern on this site is trichloroethylene (TCE). During the time of data collection, the landowners were in the process of procuring funding for development. At
this time, funding has been made available and management of the contaminants and
demolition of the building are in process.

Literature Review

Reasons for studying differences between residents and experts

It is important to understand differences between perceptions of risk among
residents and experts. Experts could be unaware of behavioral factors that create special
exposures that increase the risk for residents. Uncertainty could lead residents to
miscalculate the risk posed by a chemical. When there is uncertainty about a risk, the
resulting affective response leads to awareness of the problem but little interpretation of
its scope or magnitude. Panic and avoidance are two common outcomes of such affective
responses to risks (Damasio, 1996). There are other important differences between lay
and expert perceptions of environmental health risks and they can affect decisions about
health behaviors (J.K. Dixon & J.P. Dixon, 2002). With differing familiarity with
chemicals, knowledge of the effects of different levels of contamination and stakes in
hazardous waste management, experts and residents are likely to have different thought
processes about these risks (Israel et al, 2005). Residents face more intense, frequent and
consistent exposure to hazards and since many brownfield sites are in inner-city
neighborhoods, residents may not have the means to change their likelihood of exposure.

For those who reside near brownfield sites, it is important to understand what an
appropriate level of risk is. Perceptions of risk vary between population groups differing
in demographic characteristics including race, gender and educational level. These
perceptions can lead to different decision-making processes (rational or experiential) and affective responses can impact the actions people will take or perhaps decide not to take (Slovic, Peters, Finucane, & MacGregor, 2005). Effective risk communication will give community members the information they need to understand the hazards posed by contaminants, actions steps they can take and information on who to contact for more details. It will also consider the channels that these community members would use to find information as well and ensure distribution in that manner. If residents and experts use different methods to seek information and the expert population does not consider this important possibility, even a well-designed communication may not reach its target population.

Modes of lay thinking and key differences from experts

As does the expert population, the lay population tries to assess the hazards posed by chemicals in the environment around them. People consider these hazards in many ways; our senses can sometimes tell us which items that cross our paths are dangerous, for example (Neil, Malmfors, & Slovic, 1992). Additionally, citizens are exposed to a large amount of information through the media about chemicals and risks. News stories covering hazardous waste tend to focus on those events and exposures that are the most extreme. Understanding the drastic consequences of mismanaged chemical waste in the case of Love Canal or nuclear power in the case of Chernobyl can inform the public of worst-case scenarios and encourage them to hold decision-makers accountable. However, there is less information presented to the public about the differences between
distinct types of contaminated sites. Without knowing the difference between a Superfund National Priority List (NPL) site that is leaching toxic chemicals into the water supply and a benign brownfield site that poses only a theoretical risk, the lay population is at a disadvantage in understanding the risks they face. When presented with information about contamination in their community then, it is likely that the mental availability of extreme events like Love Canal and Chernobyl will make a lay person's affective response so strong that resulting feelings of panic and dread will lead an impulsive decision-making process (Damasio, 1996; Kasperon et al., 1988; Plous, 1993; Slovic et al., 2005). This could elicit reactions such as avoidance of the problem, distrust of information sources, or anger instead of engaging in the necessary long-term action steps that can lead to a positive change (Slovic, E. Peters, M. L Finucane, et al., 2005c).

Intuitive toxicology is a term for the ways in which the lay population assesses which chemical exposures are harmful to them (Neil et al., 1992). As mentioned, sensory perception is one method of intuitive toxicology. In many ways, perceptions of risk based on these processes among lay populations and findings from toxicological research among expert populations are quite similar (Kroll-Smith, Brown, & Gunter, 2000). One major area of difference seen between lay populations and experts is that the lay population tends to consider "natural" chemicals to be safer than "synthetic" ones (Neil et al, 1992). Additionally, in previous studies the lay population generally did not consider the dose or length of exposure to be important (Neil et al, 1992). It is possible that this is due to lesser comprehension of the importance of dose-response relationships, something that is fundamental to toxicology and risk assessment. Paracelsus once said that “the
dose makes the poison.” This statement reflects a principle in toxicology called dose-response relationship that states that as exposure and dose to an agent increase, the risk of disease increases as well. Lay populations tend to consider chemicals as either safe or harmful, with a small exposure implying almost certain harm and don't consider an increasing gradient of risk with exposure (MacGregor, Slovic, & Malmfors, 1999b).

Another model of lay thinking is popular epidemiology (Brown, 1987, 1992, 1995, 1997; Kroll-Smith et al., 2000). When a community discovers that a number of people are experiencing a certain disease, members of the community take action to investigate causal factors. As an example, some members of the community might notice that the water has an odd taste and that there are a high number of cancer cases in the community. The community would then report it to the EPA or another public health agency and the government entity then conducts a formal investigation. Through partnerships and investigations like this, the government has become aware of routes of exposure and diseases caused by chemicals that it otherwise would not have (Brown, 1987).

Though investigations based community reports also find that a chemical hazard is only perceived, these paradigms of thinking are not to be undervalued. Popular epidemiology offers a source for detecting hazards that otherwise would not be obtained. It is possible that surveillance methods aren’t sensitive enough to detect underlying patterns of disease (one small segment of an area has the majority of cases from a larger cluster). If that is the case, problems caused by the ecologic fallacy would be at least partially corrected with a second source of data. Differences in methodology between
experts and residents are not without contention in both groups. From some in the expert population, a positivist paradigm of thinking dictates that residents do not use a sufficient method for eliciting the truth. Among the lay population, people question the burden of proof that is necessary to elicit a response from the government, slowness to action when it does happen, and lack of certainty in scientific studies, particularly if in the past certain information has not been made public, has been ignored, or has been overlooked for political reasons (Kroll-Smith et al., 2000). In spite of these reservations, through partnerships, communities of concern and government entities have successfully created effective public health action.

**Information-seeking methods among residents**

Distributing health information is a complicated task that needs careful planning, cultural competency and attention to detail. When the targeted population is marginalized, there is evidence suggesting that these facets become even more important. For example, if information is distributed to a community in a manner that does not account for the literacy and methods by which community members typically access information, a program may only reach those who are most educated and worsen existing disparities by expanding gaps in information and knowledge (Sligo, & Jameson, 2000). An expert may explain hazards in a way that does not address the perceptions, beliefs and behaviors of residents (Spink & Cole, 2001).

Among participants in a study about the information-seeking behaviors of low-income African Americans, the most trusted source of health information was a physician
and the most trusted source of general information was family (Spink & Cole, 2001). This method of information-seeking is probably quite different from that of a scientist who through her or his education would likely be trained to turn to primary scientific literature and other empirically-derived sources. It is critical for public health practitioners to consider this difference, particularly when educating communities about diseases caused by involuntary exposures. One study of urban youth found that the two most common methods of information seeking were through a person they knew and then through their cell phones (Agosto & Hughes-Hassell, 2005). It is likely then that navigating the EPA’s website would not be one of the steps that a significant proportion of an exposed, marginalized community would take.

**Theoretical Framework**

Dixon and Dixon’s integrative environmental health model combines four domains to explain environmental health hazards (J.K. Dixon & J.P. Dixon, 2002). These are the physiologic domain, the vulnerability domain, the epistemological domain and the health protection domain. The physiologic domain describes the chemical and physical processes that influence exposure, intake, and biological effects of an agent. Much of the current research conducted in environmental health sciences focuses on aspects of this domain. The vulnerability domain describes the differences in individual and community characteristics that affect susceptibility to the agent of interest. The idea of environmental justice is derived from real and perceived differential vulnerability across social strata. The epistemological domain comprises issues surrounding personal
thinking and social knowledge in the context of environmental public health. The health protection domain describes the things that individuals and communities can do to reduce their susceptibility to exposures (J.K. Dixon & J.P. Dixon, 2002).

Figure 3. Visual Representation of Dixon & Dixon's Integrative Model (Jane K Dixon & John P Dixon, 2002)

This theoretical model (see Figure 3 for a visual diagram) frames environmental health hazards in a context that extends beyond the breadth of toxicology and risk assessment with its epistemological and health protection domains. Studies conducted in this model give public health practitioners a better framework for deciding which aspects of risk need to be discussed in greater detail, which methods of communication to use to reach communities of concern, which thought processes need to be addressed in a risk communication effort, and which behaviors to address as well. Understanding how to disseminate information garnered through risk assessment in a way that addresses a community's concerns and informs them of actions they can take is a critical step toward
building better relationships between communities of concern and institutional entities.

Dixon & Dixon’s model has been applied before in a number of setting and has also been modified into a psychometric instrument (J. K. Dixon, Hendrickson, Ercolano, Quackenbush, & J. P. Dixon, 2011; Hill, Butterfield, & 2006; Larsson, Butterfield, Christopher, & Hill, 2006; Perron & O’Grady, 2010)
Chapter 2: Methods

Selection of Topic

The study called "On Our Soil: Brownfields and Litter in Weinland Park" has the goal of building a common language between scientific experts and residents of the Weinland Park community regarding environmental public health issues. To facilitate that dialogue, understanding the differences in perceptions of these issues between these groups was seen as a necessary step. The vulnerability, epistemological and health protection domains of Dixon & Dixon's integrative model were likely to have significant gaps and this led to the types of data we collected, which included focus groups, interviews, photovoice and go-along interviews.

The interview and focus group data were chosen because they were the most complete and rich datasets. Due to the complexity of the two issues, one was chosen to examine differences. In many ways, brownfield sites could evoke similar responses to other environmental contaminants. Like radon and many other chemicals that pose an "invisible threat," they escape sensory detection and the perception of risk comes from the knowledge of the contaminant's presence. The two types of data (focus group and interview) were chosen because they were more comparable (experts did not complete go-along interviews or photovoice). The larger process of this study is described below.

Committed experts and community members formed a steering committee that met monthly to guide this project. During early meetings, the community chose two
environmental health issues in the community, litter and brownfields. After each meeting, evaluation surveys were given to ensure that meetings were being conducted in a way that was fair, respectful and useful to community partners. During each meeting, the community members were informed of the progress of the study, the phase of research currently being undertaken and asked for their input. Community members were given a gift card to a local grocery store at each meeting as an incentive for their participation.

Recruitment

Residents were recruited through convenience sampling, placing flyers in community centers such as the Godman Guild settlement house, Neighborhood Pride center, library, laundromat, churches and other similar places within the Weinland Park community. Residents were given a gift card to a local grocery store as an incentive for participation. Residents under 18 years of age, who did not live in an address within our defined boundaries of the Weinland Park community (see Figure 2) or those who had not resided in the Weinland Park community for at least one year were excluded from participation in the study. Experts were recruited via purposive sampling based on their expertise and were contacted via email and telephone. Those who were eligible and participated were given a USB flash drive for their participation.
Measurement

Data were collected through semi-structured interviews and focus groups. Questions for these interviews were based on the Dixon & Dixon model and based on a study that was conducted to examine attitudes toward radon in rural communities (Jane K Dixon & John P Dixon, 2002; Harnish et al., 2006). The interview questions covered all four domains of the Dixon & Dixon model including specific aspects of each domain. The interview guides included suggested probes to elicit details that may have been missed due to phrasing (for more information see Appendix A). In addition to domain-specific questions, participants were asked if they were familiar with the term brownfields, whether they would eat vegetables grown in the Weinland Park neighborhood and whether they would eat vegetables grown in the community garden at Godman Guild.

The interviews were co-moderated and audiotaped, transcribed, cleaned and coded. The coding structure for this project is based on the Dixon & Dixon model and was developed and tested by a group of five researchers, including an expert who was not involved in data collection, and modified through initial testing before a final structure was used to analyze all interviews. Groups of at least two researchers coded each domain and compared codes for agreement before finalizing codes. For the purposes of this analysis, the coding structure developed by this larger group was modified and shortened to address the research questions posed in the predicted findings (copies of the codebook and a visual map of the concepts and nodes can be seen in the Appendices E and F).
When the analysis was conducted, most terms in the codebook did not have a dictionary of acceptable words created beforehand and instead it was created during the process as responses matched nodes on the coding structure (see Appendix F) (Neuendorf, 2002). An example of a distinction between nodes is that between specific knowledge of chemical agents and non-specific or general knowledge about them (see Appendix E). These nodes were primarily derived from the categories listed in Dixon & Dixon's integrative model (e.g. agent, exposure, incorporation, body burden), others author-derived (e.g. scholarly vs lay sources of information) and others being finer, dichotomous distinctions (e.g. high body burden vs low body burden, awareness of the term of brownfields vs lack of awareness). In the example of specific vs general knowledge of chemical agents, this distinction came from the idea that though people may be aware of the presence of chemicals, a measure of technical familiarity is knowledge of specific chemicals present in the brownfield sites. Any responses that mentioned specific chemicals (arsenic, TCE, etc) were coded as specific, but if a response contained phrases more similar to “those chemicals,” “that chemical waste” it was coded as non-specific information.

For the sake of reliability, especially considering that there was only one coder and intercoder reliability was not assessed, the coding scheme included only manifest content and not latent content (Neuendorf, 2002). This project was submitted for review to the Institutional Review Board at The Ohio State University and was determined exempt under category 2 listed as project number 2010E0255.
Table 1. Demographics of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Residents</th>
<th>Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>64.5%</td>
<td>0%</td>
</tr>
<tr>
<td>White or Caucasian</td>
<td>32.3%</td>
<td>87.5%</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>3.2%</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>35.5%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Female</td>
<td>64.5%</td>
<td>62.5%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some High School</td>
<td>16.1%</td>
<td>0%</td>
</tr>
<tr>
<td>High School or GED</td>
<td>32.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Some College</td>
<td>25.8%</td>
<td>0%</td>
</tr>
<tr>
<td>College Graduate</td>
<td>25.8%</td>
<td>75%</td>
</tr>
<tr>
<td>Graduate or Professional Degree</td>
<td>0%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Mean Time Living in Weinland Park</strong></td>
<td>8.9 years</td>
<td>N/A</td>
</tr>
<tr>
<td>Mean Time Working in Environmental Science</td>
<td>N/A</td>
<td>12.3 years</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>35.5%</td>
<td>0%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>64.5%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Job Title</strong></td>
<td>Not available for residents</td>
<td>Assistant Professor, Environmental Manager, Outreach &amp; Program manager, Property Maintenance Supervisor, Registered Sanitarian II, Vice President</td>
</tr>
</tbody>
</table>
Chapter 3: Predicted Results

Preface

Given the traditionally underrepresented population of Weinland Park, the proximity of brownfield sites to residents and the need for residents and experts to communicate effectively to solve these problems, it was expected before analysis and after literature review that these themes would emerge from the interview data. Residents and experts were very different demographically with respect to education and race and it is expected that these differences will lead to gaps between the two groups with respect to their perceptions of brownfield sites. Predicted findings were given for each domain of the Dixon & Dixon model.

Physiological Domain

- Residents will be able to identify fewer specific chemical agents and health effects than experts.

It is likely that the resident population has lesser familiarity with pathology, toxicology and chemicals used in industry and their downstream health effects. Because of this, it is expected that the experts will identify a greater number of chemical contaminants. Without formal training in toxicology, it is likely that residents will not identify as many potential health effects. Though many in the public are probably
familiar with cancer as a health effect from exposure to chemical waste, there are a number of other health effects including threats to kidney function, reproductive health, liver function and lung function that may be less salient to residents, a barrier which could prevent residents from identifying as many health effects as experts.

- **Experts will identify more routes of exposure than residents.**

  Another dimension of lacking familiarity with environmental health science could be not knowing all the ways in which a chemical could enter someone's body. Because routes of exposure can be quite complex (chemicals can undergo environmental transformation, can enter through more than one site) it is expected that experts will identify more routes of exposure.

**Vulnerability Domain**

- **Experts will identify community characteristics and system-level issues as more relevant to vulnerability; residents will identify individual characteristics as more relevant.**

  As public servants and scientists, the experts are outsiders of the Weinland Park community. With less consideration of individual behavior in their roles and a presumed lesser familiarity with the behaviors and personalities of residents, it is expected that they will identify aspects of the entire community that make it more vulnerable in greater number and detail and not be as aware of individual factors.

  Residents, on the other hand, may not be familiar with some more technical differences between communities (related to city planning and similar fields) and effects
they have on health and social issues. Residents also face potential exposure and this is likely to make understanding how they and their loved ones are more vulnerable than others to health effects from a chemical a primary concern.

_Epistemological Domain_

- _Experts will be more likely to seek scholarly resources for information; residents will be more likely to trust community sources and friends._

Empirical literature indicates that there is great variation among demographic groups in information-seeking practices (Agosto & Hughes-Hassell, 2005; Spink & Cole, 2001). While an Internet search can lead to scholarly information, it can also lead to non-scientific sites as well which may or may not have accurate information. For this reason, it is expected that these patterns will influence how residents and experts would gather more information about brownfield sites.

_Health Protection Domain_

- _Experts will identify solutions that are based more on systems-level changes, residents will identify solutions that are based more on individual-level changes._

Based on their roles and insiders and outsiders and which aspects of environmental health they can change, which solutions are mentioned more, emphasized more or mentioned in greater detail is expected to be influenced. I expected to see that experts would focus on solutions that involved cleanups, funding grants, monitoring and
surveillance. Similarly, education that comes from the system to the community is another theme I expected to emerge.

I expected, however, to see that the residents would focus their attention more on action steps they could take such as educating themselves, advocating for their community, staying away from the brownfield sites and other similar action steps. Because of their lesser knowledge of chemical hazards and similar steps, I did not expect residents to mention cleaning up the waste as something they could do, but rather to speak about general steps listed for the cleanup process such as “they should get rid of it” or “they should solve the problem.” Because of their greater control of their own actions than of brownfield sites and also because of possible feelings of exclusion from the system, I expected that residents would focus on individual actions.
Chapter 4: Results

Physiological Domain

Agents

None of the residents identified specific chemical agents and experts only listed a few. These included TCE, VOCs, asbestos and arsenic. Residents spoke about these hazards using more general terms such as “those chemicals” and “chemical waste.” Among both residents and experts, physical and experiential hazards were mentioned. These physical and experiential hazards were mentioned with much greater frequency and detail among the residents than were the chemical hazards. Some of these hazards included broken glass, drugs, gang violence and unstable building structures. The 3M site was also identified by residents as a location where animals (e.g. rats, opossums, raccoons, cats) breed and take shelter.

"And 3M - they should tear it down; it's an eyesore. I don't know anything about the chemicals or anything, but it's been empty a long time" (resident)

Health Effects

Among experts, the health effects most commonly spoken of were cancer and respiratory diseases. Residents identified these same effects as well as asthma and other
nonspecific respiratory diseases, eye irritation and a number of dermatologic conditions including hives. Some residents did not identify any specific health effects or only mentioned general poor health. A number of residents and experts agreed that psychological health effects are an important consideration. One expert mentioned that the psychological health effects can lead to downstream physical manifestations and a resident mentioned that these psychological effects would only happen if the person was aware of the site being a brownfield.

*Exposure*

There was little gap between experts and residents in their responses about exposure, among those residents that did mention exposure. A number of residents did not identify specific means of exposure and one mentioned they did not want to imagine or "invent" what they would be. Common routes of exposure listed included ingestion through water or plants grown in the soil, inhalation of dust and indoor air and dermal exposure. Experts mentioned that contaminants could seep into the soil, then into water and possibly into indoor air. Among residents, a number mentioned that chemicals could catch on fire (either from arson or from accidental fires among people trespassing into the properties) and then enter the surrounding air and be inhaled by the community. In terms of dose and incorporation, experts consistently said that a high body burden was necessary, but residents, if they mentioned body burden, were mixed. The majority said that a high body burden would be necessary, but a low body burden was also mentioned.
Vulnerability Domain

There was a significant amount of overlap between the residents and experts in their responses regarding the vulnerability domain. However, this is only true of the residents who mentioned aspects of vulnerability; a number of residents said there was nothing in particular that made the Weinland Park community more or less vulnerable on an individual or community level. A common theme among their responses was that if everything else were equal between Weinland Park and other communities (regarding distance from contaminated sites), there is nothing that makes Weinland Park more vulnerable.

Individual Characteristics

Residents and experts agreed on a number of individual characteristics that make one more susceptible to health effects from brownfield sites. These characteristics included age and health status. Age was identified with high frequency and detail, particularly because of the behaviors of children.

“...any type of group that’s going to be attracted to being in air is going to be more affected and particularly kids. ... There’s a phenomenon known as pica in kids—some kids will eat dirt...it’s just a small part of the population but it occurs in children for the most part more than adults. And so we worry a lot about that as far as them, b/c they think it’s cool and neat—we’ll make it our club house.” (Expert)
Health status among people who are immunocompromised (e.g. living with HIV or AIDS, currently receiving chemotherapy), pregnant women, people with deficient nutrition and people with other existing health conditions (asthma) are all more likely to experience negative health effects. Criminal status was another characteristic that was commonly agreed-upon by residents and experts. Because entering these buildings illegally places a person in closer proximity of chemical exposures, unstable building structures and other physical hazards, people in gangs and people who engage in illegal business are more vulnerable. The homeless were another group identified as vulnerable because they could stay in the buildings and start fires accidentally (either by building them or by using electricity).

**Community Characteristics**

Residents and experts agreed that the location of the Weinland Park community was an important community characteristic related to vulnerability. The two sites in proximity to community members make Weinland Park more vulnerable. Poverty and the perception from that Weinland Park is not a community that will demand action from decision-makers were also identified as community characteristics of vulnerability by both groups. A number of residents who mentioned poverty as a key community characteristic also mentioned that it is the main factor, such that if everything were equal between Weinland Park and other communities with respect to income, no other factors would make it vulnerable compared to other nearby communities.

“Well, I think you put anybody from [a wealthier community] in the brownfield and they’re likely to be as affected as local residents here. I
don’t think the residents of Weinland Park — let’s just say, all other things equal, let’s say both types don’t know about brownfields but they’re living in proximity to brownfields, potentially they’re equally at risk." (resident)

"I definitely agree with that cause you know, if it was in [a wealthier community], would they let those piles of soil contaminated with who knows what sit there for that long? I’m sure they wouldn’t." (resident)

Some residents brought up that the previously mentioned perception of Weinland Park residents' passivity could also lead them not to take action.

“ . . . all other things being equal . . . the residents in [a wealthier community] might have more perceptions of themselves as having power to demand some form of intervention on the part of the state or the city to do something about that. On that level, I would say, sure, the residents of WP are more at risk because their perception is that they don’t have that much power and influence." (Resident)

**Epistemological Domain**

While most of the residents knew that there were contaminated sites in Weinland Park, most did now know that they were called brownfields. All experts were familiar with the term brownfields and had some familiarity with the brownfield sites in Weinland Park. Experts universally agreed that brownfield sites pose a problem in Weinland Park, whereas residents were mixed in their opinions and some did not consider brownfields to be an issue at all. Residents and experts agreed that the responsibility for educating the community about hazards and eliminating risks from brownfield sites falls on the government and property owners.

" . . . you want your city to be clean, the city needs to clean it. You want your kids to be clean, the parents need to clean." (Resident)
There was a more significant difference of opinion with regard to information sources and trust in them between experts and residents. Though both groups mentioned using an Internet search to find information, experts mentioned using sites like Google Scholar, which would lead them to primary scientific literature, whereas residents mentioned using Google itself, which leads to a variety of sources of information, many of which are not empirically derived or peer reviewed. Experts trusted scholarly sources and said they would turn to primary scientific literature, personal contacts in the field of brownfield redevelopment and environmental science (such as the Ohio EPA and health department) for further information. A number had previously looked for information about brownfields and indicated trust in these information sources.

Residents were less consistent in their responses, with some indicating they would go to primary scientific literature and others indicating that they would go to people they knew. Some of these personal contacts included family members, people who had previously worked at the sites when they were in business and people they knew to have scientific expertise. Another common method of information-seeking mentioned by residents was an Internet search. Though sites like PubMed and Google Scholar can lead someone to primary literature and sites from government agencies like the EPA publish reliable, empirically derived information, a number of non-scholarly sources can also come from an Internet search using a search engine like Google. Residents also mentioned using a variety of methods at a library, including looking at books and blueprints. A common theme among the residents was a lack of trust in the information
they were given and looking to multiple information sources to get information that may be left out by one.

“I’ll look in the book and I’ll read about it cause these buildings must’ve been here twenty, maybe thirty years ago . . . my grandfather . . . tells me about this factory or worked there—he’ll tell you about it . . . I think everyone’s trying to save their butts. Like they give you mixed info[rmation]. . . no one wants to get in trouble or a claim, wants to take the blame for themselves. . . they go around the bush with it . . . I gotta read a couple of them. You know, different sources—go from source to source and then put it all together.” (Resident)

"I would never ever trust a private corporation's information about brownfields. Absolutely not. No way." (Resident)

Health Protection Domain

Residents and experts agreed that a set of actions need to take place in order for the problem of brownfields to be solved. First, a partnership between the community and government entities needs to be established so that community health can be improved. Second, community members need to be educated about the health hazards of brownfields, what actions they can take, and of any other relevant information. Distancing vulnerable populations from brownfield sites was one action mentioned by both groups. Finally, the brownfield sites need to be remediated and redeveloped. In some cases, however, opinions about how these actions should occur differed.
Individual and Community Action Steps

Advocacy was seen as a necessary step by both residents and by experts. Both groups agreed that residents need to take the initiative in letting the scientific and government parties know about problems. Residents saw it as necessary to continually contact decision-makers until action is taken and to hold those in the system accountable for their actions and for improving the community, both in ensuring that there is funding and also in ensuring that the cleanup is complete and that surveillance takes place.

Distancing vulnerable populations was also mentioned as both a community and system action step. A number of residents mentioned staying away from brownfield sites and educating their children to do the same as well as getting the site owners to put up barriers around brownfield sites. Finding out as much information as possible and organizing as a community to advocate and ensure that action is taken was listed as a necessary step. Some experts also mentioned that residents should partner with other communities to see that actions are carried out in a more efficacious way.

“some of the same issues you’re seeing in Weinland Park . . . trickle to the surrounding communities—they’re having the same issues, the same problems. Maybe there has to be some sort of coalition that actually brings [in] all these communities—it’s not just focused on Weinland Park. You can solve all the problems in Weinland Park, but . . . they’re going trickle down; they’re gonna come back to the area. . . ”

(Expert)
System Action Steps

Residents and experts agreed that responsibility for remediation of these sites does not fall on the community and that government entities need to educate the community about any hazards posed to their health. Experts and a few residents mentioned the system’s responsibility to put up barriers and keep people away from brownfield sites. Both groups stated the system needs to clean up the sites and that the residents don’t need to take a part in it. In fact, one resident mentioned that that it was important to educate community members not to take part in the cleanup process unofficially because they would probably lack the technical expertise to do it safely.

"...people can die just trying to go in there and be good citizens and help" (Resident)

A number of methods were identified for education. Residents focused on message-based approaches such as signs, pamphlets and community meetings, but experts focused on more interactive solutions that would allow the residents to ask questions. One expert had the idea of a “porch chat” method that is outlined in her quote below.

"There’s a method that...we call “porch chats” where we will just go out and walk the neighborhood and talk to people where they are—in their front yard raking leaves, on the front porch or back porch doing hair, in the library where there’s a group of kids, in the basement of [a church] after lunch—we will go sit and talk to people where see them gathered. ...and just have conversation with them about what’s going on. ...I don’t think it can be people who don’t already have
relationship within the neighborhood. I don’t think it works to have a neighborhood design center come in and do stuff as well as it does to have existing professionals and institutions that have a history of working in that neighborhood and are relationally connected to people in that neighborhood do stuff. And I don’t think community meetings work compared to that methodology.” (Expert)

Inclusion of the community in decision-making processes was a common theme among experts when discussing action steps necessary to solve this problem. Experts mentioned that community members need to be included for many reasons. It was eluded to that the perspective of residents is not present, and also that residents should be included due to their stakes in outcomes, their knowledge from experiences, and their own needs and desires to understand what is being done to the community in which they live.

"[The system] need[s] to hear the voice of local residents, they are the ones who live there, they're there every day and exposed to all this; you don't want someone from outside to take care of the whole process“ (Expert)
"... there’s this idea that the information isn’t yet complete and we’ll make people aware when things are complete. What ends up happening, though, is then people get shut out of decision-making processes and the opportunity to participate in those. So, I think disclosure of information. I know that when I’m talking to everyday people on the street, not in meetings but just talking to folks on the street, they’re very curious about what’s happening with—particularly CCF and 3M. People are hungry for information and I think currently information is not available or accessible enough." (Expert)
Chapter 5: Discussion

Broader Implications

The results of study indicated a need for improved risk communication between the experts in the city of Columbus and the Weinland Park community. Among respondents, there were significant gaps in perceptions of risk associated with brownfield sites. A number of residents did not consider brownfield sites to be a problem. It is possible that, like many environmental problems, brownfield sites pose an “invisible threat” to the community and the lower salience leads to a lesser perception of risk (Plous, 1993). Additionally, it is possible that uncertainty combined with the possibility of severe consequences of exposure provokes such a strong affective response among residents that they avoid the problem of brownfield sites by pushing it out of their minds (Gregory & Mendelsohn, 1993; Plous, 1993; P. Slovic et al., 2005). Another possibility is that assurance from government entities that the sites were under control could lead to the perception that the problem is now nonexistent.

A number of residents mentioned that they would speak to someone that they knew or told the interviewer that they would ask them for information about brownfields. This is consistent with studies of similar populations where the most trusted source for information about health was someone personally known to have expertise (Sligo & Jameson, 2000). In addition to busy schedules and a lack of familiarity of which places to find information most quickly, there are a number of possible reasons a resident would
not turn to primary literature. First, it is possible that there is a lack of trust in a written source of information. Perhaps some residents do not have trust in the process of scientific publication. In studies done previously on popular epidemiology, distrust and dissatisfaction with the scientific process was a cause of dissent between the lay and expert populations (Brown, 1987; Kroll-Smith et al., 2000). Historical injustices in research like the infamous Tuskegee syphilis study in which African American men were denied access to a cure for decades after its discovery for the benefit of scientific knowledge of syphilis' effects on the human body have caused a great deal of distrust in the scientific and medical fields among African Americans. Many steps are taken to ensure that research is conducted ethically today, but many other unethical studies have caused this lack of trust and damaged the scientific community's relationship with the public.

Because of the burden of proof required to infer causation and elicit action from the government, many resident populations end up frustrated by a lack of action from government entities (Kroll-Smith et al., 2000). Similarly, a tendency among lay populations to find a correlation between an agent and a disease without considering dose and exposure can make it difficult for expert populations to explain the scientific process (MacGregor, Slovic, & Malmfors, 1999). Ultimately, these gaps can ironically end up shutting residents out of the decision-making process in research on an association they initially found (Leung, Yen, & Minkler, 2004; Savage et al., 2006). For these reasons, it is possible that some residents in the Weinland Park community might feel that some information is being left out of written publications.
Another possible reason residents may have mentioned lay sources for information more frequently than experts is a lack of self-efficacy in finding and interpreting the correct information from scientific studies. Jargon is a common barrier to communication in the scientific and medical fields for experts working with the lay population and educating them about risks (Wellington & Osborne, 2001). The amount of jargon in scientific publications might discourage those individuals who would read information from even trying. Past unsuccessful attempts to interpret information or past experiences of being overwhelmed by the amount of material available may limit the self-efficacy of residents to find sufficient, relevant timely information. There is evidence that gaps in information-seeking behaviors exist in communities due to flaws in the process of experts imparting information to community members (Sligo & Jameson, 2000). Because so few residents were familiar with the term “brownfields” and instead used phrases such as “contaminated sites,” an Internet search (a method commonly listed by residents to find information) was conducted to see what information they might come across without knowing the word "brownfields".
This Internet search using the phrase “contaminated sites” (see Figure 4) elicited a large amount of technical information, some of which would be applicable to the sites in the Weinland Park community and some of which would not. A person who conducted this search would find information on how contaminated sites are redeveloped but would come across little information about specific sites in their neighborhood, the steps that are typically taken by residents, the legislation associated with sites like these, and perhaps most importantly, whom to contact for more information.
A second Internet search (see Figure 5) led to a larger amount of specific information about the brownfield sites in Weinland Park mentioned in this study. Information from these sites included the names of developers and much of the content was news. Content relevant to residents is contained within the results of this search, but only two of the websites listed the term brownfields in their title or description. After further examination of the websites, I concluded that this search could give some of the relevant information that a resident might want to know (funding, timeline, etc.). In order to find information beyond the funding and history of the site with information about the contaminants, however, a resident would have to go to another site; to find out the legislation relevant to brownfields, a resident would have to go to a third site; and to
learn about what other communities have done and what actions they can take, another search may be necessary. In a community where many residents have children, have limited time and have other concerns in addition to environmental health, it may be an unrealistic expectation that residents will make, find or take the necessary time to gather all this information. The quote below from a resident describes this further.

“I also think that it’s too much to expect [of] individuals, [especially because] there’s a fair degree of illiteracy in the neighborhood. There’s also extremely busy parents with children, moms who work 2 or 3 jobs, I know that. You can’t put that on individuals. I think that is a collective, community thing.” (Resident)

The other results of this study are consistent with the literature; the additional hazards posed by brownfields (economic, physical threats and experiential hazards from crime and unsafe buildings) were highly relevant to both residents and experts (Greenberg, 2003b; Litt et al., 2002; Green, 2002; Wernstedt et al., 2004). One expert’s opinion changed from initially saying brownfields were not a problem to saying they were a problem in Weinland Park at the end of the interview.

**Recommended Actions**

Results from this study suggest a need for comprehensive risk communication about the health effects of brownfields as well as coalition-building activities with other communities and between experts and residents. A number of residents and experts
suggested placing signs on contaminated sites as an initial step to inform the public about hazardous waste. This is an important step, particularly if signs on sites contain contact information for residents to find out more about the sites, chemicals involved and the realistic impact they have on their lives. Research indicates that message-based risk communication approaches like signs are only sufficient if the receiver is familiar with the hazard (McComas, 2006). Additionally, if information about a risk is not sufficient, a resident may not take preventive action steps (Griffin, Dunwoody, & Neuwirth, 1999). Without this information, the awareness of a hazard can lead to many questions about risk, can precipitate a strong affective reaction and can cause panic, dread or a complete lack of action (Gregory & Mendelsohn, 1993; Griffin et al., 1999; Kasprow, Ortwin Renn, Paul Slovic, et al., 1988a; Plous, 1993; Slovic, Peters, Finucane, et al., 2005c). For hazards such as brownfield sites, process-based approaches that allow the receiver to ask questions and understand risks to a degree of sufficient certainty are likely to be more efficacious.

A number of process-based solutions emerged from the interviews: the "porch chat" methodology outlined in the previous chapter, community meetings and formation of a community task force to deal specifically with brownfield sites, and partnership between community members and government agencies. These are likely to be more effective long-term solutions and improve the health of the Weinland Park community. It can reasonably be expected that the self-efficacy of community members to learn more about and prevent other environmental health problems will be improved by learning
which steps to take in this case (Griffin et al., 1999). Conducting focus groups with residents to learn about common concerns and questions would be useful first step.

The development of a website containing relevant information in understandable language would be a logical next step. This website should include information on brownfield sites, relevant policy information, a list of steps taken by builders, information on the health effects of specified contaminants, a Frequently Asked Questions section addressing common concerns, information about the risks for communities within the vicinity of sites and a realistic description of the daily impact of brownfields, actions that the resident population can take and contact information for experts. Links to other agencies that have more detailed information and relevant news articles would be useful so residents can be more easily connected to further information. Steps on how to get involved are also important to increase trust and to prevent residents from feeling like they are being shut out of a decision-making process (Savage et al., 2006).

Another idea mentioned in interviews was a partnership between the Weinland Park community and other neighboring communities that are affected by brownfield sites. One expert stated that impact of a brownfield site extends to surrounding communities. Partnerships between communities can eliminate redundancy in educational efforts, increase the number of people working toward the same cause, and lead to a sharing of ideas on what has worked so that community-generated efforts can be more targeted and effective.

"...it's not just focusing within Weinland Park, you're looking at the other side of the tracks—you have all these industrials areas. And that has an impact on Weinland Park. ...In order to look at these problems,
we need to look [at] what’s in the surrounding areas. You can just have a border within one neighborhood and the other, but [if on the] other sides [there is] lots of industry, it’s going to have an impact on Weinland Park even though they're outside the boundaries of WP."

(Expert)

Ideally, the website I mentioned before would be something that is a collaboration between communities so that the lay population can have one site to go to specifically, can contribute more information to the same site and can lead to greater public awareness. For those in the lay population who have a distrust of both government agencies and developers, if the site were to come from a community agency or non-government organization whose mission is to educate the public about environmental issues and has a strong reputation for doing this work, it can be another good step toward communication. Finally, it is important for experts to educate community partners and organizations about these issues so these residents who would ask someone they personally know have a number of people in the community to go to who can inform them and connect them to further resources and information.

Most of the other steps that could be taken are already in process or completed. As it is, the 3M site is in the process of cleanup and redevelopment. The building has yet to be demolished at this time, but when that occurs, most of the other actions identified by the residents and experts will have occurred. Long-term management and stewardship of the community is a final step that needs to be taken. Some communities have been able to get a portion of cleanup grants used for health monitoring of the nearby
communities (Litt et al., 2002; US EPA OSWER Office of Brownfields and Land Revitalization, 2011). Given the vulnerability of residents in Weinland Park, this would be important. Transiency is common in the Weinland Park community so the number of residents who will reside in the Weinland Park community long enough for a prolonged exposure will be smaller than in other communities, such that this surveillance could be a realistic goal.

Limitations of Study

Due to timing concerns, there was only one coder, which leads to unknown reliability of the coding structure. Given the material which was analyzed the coder's involvement in study design and in creation of the larger coding structure used in this project, this is probably negligible. Additionally, the decision to focus on manifest content and the inclusion of examples of distinctions between nodes in the codebook should all lessen this potential problem as well (Liamputtong, 2006; Neuendorf, 2002). Sampling of residents is another potential problem; the convenience sampling method used did not reach the entire population and is likely to only have reached limited segments of the Weinland Park community (Liamputtong, 2006). Two participants were initially categorized as experts and interviewed as such but because they resided in the Weinland Park community, we later classified them as residents for analysis. The interview questions for the residents and experts are similar enough (see Appendices A & B) that this is not likely to have affected their responses, but this means that our sample may not be representative of the community in terms of education.
Given that this was a pilot study with the aims of creating a common language between the lay and scientific communities, our small sample sizes and limited sampling methods are expected. A final limitation in this study is situational; the stage of development of the two sites we used. The Columbus Coated Fabrics site is currently remediated and the building has been torn down, but when it was still standing, it presented a significant aesthetic problem for the community. The 3M site is in remediation and the many community members were aware that people were taking action to redevelop it. It is likely that we would have received different responses from the community had we conducted this study when both sites were pre-remediation.

Future Studies

Other studies could come from this work. The research team conducted a series of interviews with the owners of businesses in the Weinland Park community after these, and though they are not included in this dataset, they are worth analysis. Studies that include more stakeholders like these business owners and managers, representatives of community organizations and community leaders would lead to more through and varied set of perspectives. A needs assessment of the community for education and of community leaders for the types of materials they would like to have for residents is also a natural next step.
Comparing the attitudes of residents of communities like Weinland Park and of residents of communities unaffected by brownfields is another area to study. Looking for common themes between these two groups could lead to a more representative picture of the general public's perception of brownfield sites. Differences in responses between these two groups may give public health practitioners and environmental scientists a better idea of what needs exist in different communities, which communication strategies to try and how best to redevelop brownfields with the best impact for the community.

Dixon and Dixon created a psychometric measure called the Environmental Health Engagement Profile (EHEP) (see Table 1) based on the integrative model used in this work (J. K Dixon, Hendrickson, Ercolano, Quackenbush, & J. P Dixon, 2009).

Incorporating it into future studies using a more multidisciplinary approach may lead to more detailed information and more accurate clues about the best actions to take.
Brownfields remain a public health problem for many reasons including chemical risk, blight, and the potential for injurious harm from dilapidated buildings. The benefits of assessment, remediation, redevelopment and long-term management extend beyond reducing chemical risk and include reducing crime, the potential for accidental injury and blight in neighborhoods, removing stigma from communities containing brownfield land, and improving the relationship between the resident and government populations.

Though the residents of the Weinland Park community and the experts we interviewed had differing levels of familiarity with brownfields and the health risks from chemical hazards, there was also a significant amount of overlap. These themes included the need for comprehensive risk communication to the community, the need for the redevelopment of this land, the need for the community's input in these decision-making processes and better information for lay populations on what they can do. Through further exploration of this topic and coalition-building with similar communities, the common goals of reuse of this land, improvement of these communities, and a partnership between experts and the communities they serve can be achieved.
References


Appendix A: Interview Guide for Resident Interviews and Focus Groups

Questions for Focus Group (FG) and Interviews (IV) on Soil Pollution in Weinland Park

Hello

Thank you for taking the time to join in this discussion on environmental health and the Weinland Park community.

My name is ___________, and assisting me is ____ We represent the Ohio State University College of Nursing/Public Health. This discussion is part of a study that is being conducted to learn about your opinions concerning pollution and the health effects of pollution for residents of this neighborhood.

The study is being conducted by the Ohio State University College of Nursing and College of Public Health.

We will now review the informed consent form. In order for you to participate in the discussion group/interview, you will need to sign the consent form. You have the form in front of you. I will now read the form. Please ask any questions you may have as I read the form.

<<READ INFORMED CONSENT FORM OUT LOUD – answer any questions. Request all participants sign the form.

Provide participant(s) with a copy of the consent form.

If anyone chooses not to sign the consent form, thank them for their time and escort them to the door.>>

Now please complete a short information form about yourself. In front of you on the (color of paper) paper is the short information form. Please take a few minutes to answer the questions on the form. When you are done, please let us know and I/we will collect the form. I want to remind you not to put your name on this form.
Once the demographic form(s) are completed, proceed to focus group/interview discussion

Before we begin, let me share some ground rules.

This discussion is part of a research project to understand the health concerns related to pollution in Weinland Park of people who live in the Weinland Park community. We are tape recording the discussion because we/I don't want to miss any of your comments.

For FG: It's important that only one person speak at a time so the recording is clear, so everyone's comments can be heard, and so everyone gets a chance to speak. Even though every one of us here in this room is obligated to honor each other’s privacy and not repeat anything we heard here in the discussion, you should all remember not to discuss any information that you would not want to be even accidentally shared outside this room. You may also use a made up name for yourself.

FG & IV: If you have a cell phone, please turn it off or set it to vibrate. We really need you to be part of the whole discussion, so we prefer that you not take any phone calls unless it is an emergency.

Remember, this discussion is confidential, and we’ll only be using first names and no one's names will ever be attached to their comments. Your answers are strictly confidential, and no one will ever hear from us who took part in these discussion groups or what any particular person said. It is important to remember that because this discussion is confidential, nothing that anyone says and no parts of the discussion should be shared at any time with anyone after the discussion ends.

The topics and questions for our discussion will cover health concerns related to pollution in this neighborhood. You may choose not to answer any or all questions, and you may choose not to take part in any or all of the discussion. You may leave the discussion at any time without any penalty to you and receive your gift certificate.

We’ll talk about a lot of different things related to pollution in Weinland Park, but the purpose of the discussion is not to provide health information or to learn about how well educated each of you are about pollution.

Also, please know that there are no wrong or right opinions in this discussion but rather just different opinions, so please feel free to share your opinion. We're interested in all opinions.

Our discussion will last about an hour and a half.
For FG: The name cards in front of you are to help everyone remember each other's names. Please fill out the name card with your first name only. <<Allow time for everyone to write their name on the card>>

**FG: Ice Breaker**
Let's find out more about each other by going around the table one at a time and having everyone tell us their first name that they wrote on their card and the name of their favorite movie or TV show.

**FG & IV:**

**Introductory Questions**
Environmental health has been defined as freedom from illness and injury related to exposures to toxic agents and other environmental conditions potentially detrimental to human health. So, some people think of environmental health as the health of the environment; some people think of environmental health as how the water, air, and soil effect human health.

We’re going to be talking about environment health as it relates to soil quality. I’d like you to think about soil quality in the Weinland Park area where you live. Just to be sure we’re all talking about the same area – here is a map of the Weinland Park area. Problems in soil quality can result from many different things.

1. In thinking about soil quality in general, not just in this neighborhood, can you name some of the reasons why there can be problems in the quality of soil/dirt? [Write list on whiteboard/paper so easily viewed by participants] [Probe for litter, trash, and brownfields]
2. In you were to grow vegetables in your yard, would you consider the things you grew to be safe to eat? What about vegetables grown in the common garden by the Godman Guild?

**Key questions**

We’re going to focus our discussion on specifically on litter and old building sites otherwise known as brownfields and their impact on soil quality. We’re going to talk about how brownfields and litter can affect health, whose health may be affected by brownfields and litter, what people know about brownfields and litter and their potential impact on health, and finally what people in this neighborhood can do about old building sites/brownfields and litter.

We’re going to start our discussion talking about litter:

[Epistemological Domain – Personal thought; Physiological Domain: Agent]

- In thinking about the litter in this neighborhood:
• Would you consider litter to be a problem in this neighborhood and if so, why?
• Where does the litter come from? [Probe: individual behavior, system issues such as trash bins]
• What types of litter are in this neighborhood?
• Where is most of the litter in this neighborhood [Probe: alleys, rental property, abandoned homes]
• What happens to the litter?

[Physiological Domain – Health Effects]
• How could litter affect someone’s health? [Probe: physical and psychological health; adults, children]

[Physiological Domain – Exposure, Incorporation]
• How could people who live in this neighborhood come in contact with or be exposed to litter? For example, could litter affect someone’s health if they touch it? Smell it? Eat it?
  o How much contact would someone have to have for it to make them sick?

[Vulnerability Domain – Individual and community characteristics]
• Some people have more bad health effects from different hazards and pollutants in the environmental than others. For example, children and the elderly are more at risk for breathing problems when there is an air quality alert from smog or other things.

• In thinking about litter—what type of person might be more at risk for health problems if they were exposed to litter/trash? [Probe: age, gender, race, location of residence, occupation, health status, nutritional status, SES]
• Have you or anyone you know in this neighborhood, had their health affected by litter?
• What do you think makes this community more at risk for health problems from litter?

[Epistemological Domain – Social knowledge]
• We’ve talked about the health effects of litter. Now I’d like to know why, where, and from whom do you get information about litter?
  • Have you ever looked for information about the health effects of litter? If so, why? And from where?
  • If you needed to look for information about the health effects of litter where would you look?
  • Who do you trust to give you good information about the health effects of litter?
[Probes: Is the information focused on reporting a problem or preventing problems from occurring? Is the information written or spoken? Is the information coming from health professionals or someone else? Possible sources of information include friends, spouse, church, books, magazines, pamphlets, TV, Internet].

- Have your attitudes towards litter in this neighborhood been affected by
  - TV or radio? civic association? Books? Gardening? Other?

[Health Protection Domain – Concerns, Efficacy, Actions]

- The final area that I’d like to talk about is what this neighborhood community can do about litter.
  - What types of things are being done now in this neighborhood about litter?
  - What are things that people/families living in this neighborhood could do about litter? [Probes: pick up litter, recycle, neighborhood groups]
  - What are things that the organizations, businesses, groups (e.g., city, Civic Association, churches) could do about litter in this neighborhood? (Probe: recycling bins, trash receptacles, more accessible trash bins)
  - What would help neighborhood residents’ deal with litter? [Probe: What types of services and information would be most useful?]
  - What do you think can actually be done about litter in this neighborhood by you? other residents? civic association? By others?

**We’re now going to focus our discussion on old industrial sites (brownfields).**

- Are you familiar with any old industrial sites in this neighborhood? If so, which ones and where are they?
- Are you familiar with the term ‘brownfields’? If so – what does it mean?

Because not everyone knows about brownfields, I’m going to give a definition of brownfields and some examples:

Brownfields are any land contaminated with hazardous chemicals that is being reused for real estate or development.

There are 3 brownfields in the this neighborhood area: the Columbus Coated factory site (runs along both sides of North Grant Avenue between East Fifth and East 11th
avenues), the 3M site (located on east side of North Fourth Street between East Fifth Avenue and East Sixth), and a third site at Cleveland Ave and 5th. (Show pictures of the sites)

[Epistemological Domain – Personal thought; Physiological domain: Agent]

- Would you consider brownfields to be a problem in this neighborhood and if so, why?
- I’d like you now to tell me everything you know about the brownfields in this neighborhood – for example, what have you heard about the Columbus Coated site? The 3M site? Anything else you can tell us about the brownfields in this neighborhood?

[Physiological Domain – Health Effects]

- How could brownfield sites affect someone’s health? [Probe physical, psychological; adults; children; elderly]

[Physiological Domain – Exposure, Incorporation]

- How could people who live in this neighborhood come in contact with or be exposed to things from the brownfield sites that could effect their health? For example, could someone’s health be effected if they touched the soil in the brownfield sites? [Probe: dermal, inhaled, ingestion; Exposure duration]
- How much contact or exposure would someone have to have for it to make them sick?

[Vulnerability Domain – Individual and community characteristics]

- Some people have more bad health effects from different hazards and pollutants in the environmental than others. For example, children and the elderly are more at risk for breathing problems when there is an air quality alert from smog or other things.

  - In thinking about the brownfield sites– what type of person might be more at risk for health problems if they were exposed to the brownfield sites? [Probe: age, gender, race, location of residence, occupation, health status, nutritional status, SES]
  - What do you think makes this community more at risk for health problems from brownfields?

[Epistemological Domain – Social knowledge]
We’ve talked about the health effects of brownfields. Now I’d like to know why, where, and from whom do you get information about brownfields?

- Have you ever looked for information about the health effects of brownfields? If so, why?
- Where would you look for information about the health effects of brownfields?
- Who do you trust to give you good information about the health effects of brownfields?

[Probes: Is the information focused on reporting a problem or preventing problems from occurring? Is the information written or spoken? Is the information coming from health professionals or someone else? Possible sources of information include friends, spouse, church, books, magazines, pamphlets, TV, Internet.]

- Have your attitudes towards brownfields in this neighborhood been affected by
  - TV or radio? civic association? Books? Other

[Health Protection Domain – Concerns, Efficacy, Actions]

- The final area that I’d like to talk the this neighborhood community can do about brownfields.
  - What types of things are being done now in this neighborhood about brownfields?
  - What are things that people/families living in this neighborhood could do about brownfields?
  - What are things that other organizations, businesses, or groups (e.g., city, civic association, churches) could do about brownfields in this neighborhood?
  - What would help this neighborhood residents deal with brownfields? [Probe: What types of services and information would be most useful?]
  - What do you think can actually be done about brownfields in this neighborhood by you? other residents? civic association? By others?

Questions derived from Harnish, Butterfiled, & Hill, 2006)

**Ending question**

Is there anything that we didn’t talk about this <evening, morning> related to litter/trash in this neighborhood? To brownfields in this neighborhood?

**FG:** [CO-MODERATOR(s) NAME(s)] is/are going to read us a summary of the key points that she heard emerge from the discussion. I’d like to you listen to the summary,
and tell me if anything was left out of the summary, or if you have anything that you’d like to clarify or add to the key points before we conclude our discussion.

_Co-moderator reads summary – asks if anything was left out, if anyone would like to clarify anything, or add any other key points._

**Closing**

I want to thank you for taking the time to be part of the group discussion.

Before we conclude, I want to remind you that our discussion is confidential nature of the discussion, so please do not share what was discussed here with anyone after you leave.

Again, we thank you all very much for being part of this discussion. We will now provide you with your gift certificate.
Appendix B: Interview Guide for Expert Interviews and Focus Groups

Questions for Focus Group (FG) and Interviews (IV) on Soil Pollution in Weinland Park

Hello

Thank you for taking the time to join in this discussion on environmental health and the Weinland Park community.

My name is ___________, and assisting me is ____ We represent the Ohio State University College of Nursing/Public Health. This discussion is part of a study that is being conducted to learn about your opinions concerning pollution and the health effects of pollution for residents of this neighborhood.

The study is being conducted by the Ohio State University College of Nursing and College of Public Health.

We will now review the informed consent form. In order for you to participate in the discussion group/interview, you will need to sign the consent form. You have the form in front of you. I will now read the form. Please ask any questions you may have as I read the form.

<<READ INFORMED CONSENT FORM OUT LOUD – answer any questions. Request all participants sign the form.

Provide participant(s) with a copy of the consent form.

If anyone chooses not to sign the consent form, thank them for their time and escort them to the door.>>

Now please complete a short information form about yourself. In front of you on the (color of paper) paper is the short information form. Please take a few minutes to answer the questions on the form. When you are done, please let us know and I/we will collect the form. I want to remind you not to put your name on this form.
Once the demographic form(s) are completed, proceed to focus group/interview discussion

Before we begin, let me share some ground rules.

This discussion is part of a research project to understand the health concerns related to pollution in Weinland Park of people who live in the Weinland Park community. We are tape recording the discussion because we/I don't want to miss any of your comments.

For FG: It's important that only one person speak at a time so the recording is clear, so everyone's comments can be heard, and so everyone gets a chance to speak. Even though every one of us here in this room is obligated to honor each other’s privacy and not repeat anything we heard here in the discussion, you should all remember not to discuss any information that you would not want to be even accidentally shared outside this room. You may also use a made up name for yourself.

FG & IV: If you have a cell phone, please turn it off or set it to vibrate. We really need you to be part of the whole discussion, so we prefer that you not take any phone calls unless it is an emergency.

Remember, this discussion is confidential, and we’ll only be using first names and no one's names will ever be attached to their comments. Your answers are strictly confidential, and no one will ever hear from us who took part in these discussion groups or what any particular person said. It is important to remember that because this discussion is confidential, nothing that anyone says and no parts of the discussion should be shared at any time with anyone after the discussion ends.

The topics and questions for our discussion will cover health concerns related to pollution in this neighborhood. You may choose not to answer any or all questions, and you may choose not to take part in any or all of the discussion. You may leave the discussion at any time without any penalty to you and receive your gift certificate.

We’ll talk about a lot of different things related to pollution in Weinland Park, but the purpose of the discussion is not to provide health information or to learn about how well educated each of you are about pollution.

Also, please know that there are no wrong or right opinions in this discussion but rather just different opinions, so please feel free to share your opinion. We're interested in all opinions.

Our discussion will last about an hour and a half.
For FG: The name cards in front of you are to help everyone remember each other's names. Please fill out the name card with your first name only. <<Allow time for everyone to write their name on the card>>

**FG: Ice Breaker**
Let's find out more about each other by going around the table one at a time and having everyone tell us their first name that they wrote on their card and the name of their favorite movie or TV show.

**FG & IV:**

**Introductory Questions**

Environmental health has been defined as freedom from illness and injury related to exposures to toxic agents and other environmental conditions potentially detrimental to human health. So, some people think of environmental health as the health of the environment; some people think of environmental health as how the water, air, and soil effect human health.

We’re going to be talking about environment health as it relates to soil quality. I’d like you to think about soil quality in the Weinland Park area where you live. Just to be sure we’re all talking about the same area – here is a map of the Weinland Park area. Problems in soil quality can result from many different things.

3. In thinking about soil quality in general, not just in this neighborhood, can you name some of the reasons why there can be problems in the quality of soil/dirt? [Write list on whiteboard/paper so easily viewed by participants] [Probe for litter, trash, and brownfields]

4. In you were to grow vegetables in your yard, would you consider the things you grew to be safe to eat? What about vegetables grown in the common garden by the Godman Guild?

**Key questions**

We’re going to focus our discussion on specifically on litter and old building sites otherwise known as brownfields and their impact on soil quality. We’re going to talk about how brownfields and litter can affect health, whose health may be affected by brownfields and litter, what people know about brownfields and litter and their potential impact on health, and finally what people in this neighborhood can do about old building sites/brownfields and litter.

We’re going to start our discussion talking about litter:

[Epistemological Domain – Personal thought; Physiological Domain: Agent]

- In thinking about the litter in this neighborhood:
• Would you consider litter to be a problem in this neighborhood and if so, why?
• Where does the litter come from? [Probe: individual behavior, system issues such as trash bins]
• What types of litter are in this neighborhood?
• Where is most of the litter in this neighborhood [Probe: alleys, rental property, abandoned homes]
• What happens to the litter?

[Physiological Domain – Health Effects]
• How could litter affect someone’s health? [Probe: physical and psychological health; adults, children]

[Physiological Domain – Exposure, Incorporation]
• How could people who live in this neighborhood come in contact with or be exposed to litter? For example, could litter affect someone’s health if they touch it? Smell it? Eat it?
  o How much contact would someone have to have for it to make them sick?

[Vulnerability Domain – Individual and community characteristics]
• Some people have more bad health effects from different hazards and pollutants in the environmental than others. For example, children and the elderly are more at risk for breathing problems when there is an air quality alert from smog or other things.

• In thinking about litter– what type of person might be more at risk for health problems if they were exposed to litter/trash? [Probe: age, gender, race, location of residence, occupation, health status, nutritional status, SES]
• Have you or anyone you know in this neighborhood, had their health affected by litter?
• What do you think makes this community more at risk for health problems from litter?

[Epistemological Domain – Social knowledge]
• We’ve talked about the health effects of litter. Now I’d like to know why, where, and from whom do you get information about litter?
  • Have you ever looked for information about the health effects of litter? If so, why? And from where?
  • If you needed to look for information about the health effects of litter where would you look?
  • Who do you trust to give you good information about the health effects of litter?
[Probes: Is the information focused on reporting a problem or preventing problems from occurring? Is the information written or spoken? Is the information coming from health professionals or someone else? Possible sources of information include friends, spouse, church, books, magazines, pamphlets, TV, Internet].

• Have your attitudes towards litter in this neighborhood been affected by
  o TV or radio? civic association? Books? Gardening? Other?

[Health Protection Domain – Concerns, Efficacy, Actions]

• The final area that I’d like to talk about is what this neighborhood community can do about litter.
  • What types of things are being done now in this neighborhood about litter?
  • What are things that people/families living in this neighborhood could do about litter? [Probes: pick up litter, recycle, neighborhood groups]
  • What are things that the organizations, businesses, groups (e.g., city, Civic Association, churches) could do about litter in this neighborhood? (Probe: recycling bins, trash receptacles, more accessible trash bins)
  • What would help neighborhood residents’ deal with litter? [Probe: What types of services and information would be most useful?]
  • What do you think can actually be done about litter in this neighborhood by you? other residents? civic association? By others?

We’re now going to focus our discussion on old industrial sites (brownfields).

• Are you familiar with any old industrial sites in this neighborhood? If so, which ones and where are they?
• Are you familiar with the term ‘brownfields’? If so – what does it mean?

Because not everyone knows about brownfields, I’m going to give a definition of brownfields and some examples:

Brownfields are any land contaminated with hazardous chemicals that is being reused for real estate or development.

There are 3 brownfields in the this neighborhood area: the Columbus Coated factory site (runs along both sides of North Grant Avenue between East Fifth and East 11th
avenues), the 3M site (located on east side of North Fourth Street between East Fifth Avenue and East Sixth), and a third site at Cleveland Ave and 5th. (Show pictures of the sites)

[Epistemological Domain – Personal thought; Physiological domain: Agent]

• Would you consider brownfields to be a problem in this neighborhood and if so, why?
• I’d like you now to tell me everything you know about the brownfields in this neighborhood – for example, what have you heard about the Columbus Coated site? The 3M site? Anything else you can tell us about the brownfields in this neighborhood?

[Physiological Domain – Health Effects]

• How could brownfield sites affect someone’s health? [Probe physical, psychological; adults; children; elderly]

[Physiological Domain – Exposure, Incorporation]

• How could people who live in this neighborhood come in contact with or be exposed to things from the brownfield sites that could effect their health? For example, could someone’s health be effected if they touched the soil in the brownfield sites? [Probe: dermal, inhaled, ingestion; Exposure duration ]
• How much contact or exposure would someone have to have for it to make them sick?

[Vulnerability Domain – Individual and community characteristics]

• Some people have more bad health effects from different hazards and pollutants in the environmental than others. For example, children and the elderly are more at risk for breathing problems when there is an air quality alert from smog or other things.
  • In thinking about the brownfield sites– what type of person might be more at risk for health problems if they were exposed to the brownfield sites? [Probe: age, gender, race, location of residence, occupation, health status, nutritional status, SES]
  • What do you think makes this community more at risk for health problems from brownfields?

[Epistemological Domain – Social knowledge]
• We’ve talked about the health effects of brownfields. Now I’d like to know why, where, and from whom do you get information about brownfields?
  • Have you ever looked for information about the health effects of brownfields? If so, why?
  • Where would you look for information about the health effects of brownfields?
  • Who do you trust to give you good information about the health effects of brownfields?

[Probes: Is the information focused on reporting a problem or preventing problems from occurring? Is the information written or spoken? Is the information coming from health professionals or someone else? Possible sources of information include friends, spouse, church, books, magazines, pamphlets, TV, Internet].
  • Have your attitudes towards brownfields in this neighborhood been affected by
    o TV or radio? civic association? Books? Other

[Health Protection Domain – Concerns, Efficacy, Actions]
  • The final area that I’d like to talk the this neighborhood community can do about brownfields.
    • What types of things are being done now in this neighborhood about brownfields?
    • What are things that people/families living in this neighborhood could do about brownfields?
    • What are things that other organizations, businesses, or groups (e.g., city, civic association, churches) could do about brownfields in this neighborhood?
    • What would help this neighborhood residents deal with brownfields?
      [Probe: What types of services and information would be most useful?]
    • What do you think can actually be done about brownfields in this neighborhood by you? other residents? civic association? By others?

Questions derived from Harnish, Butterfield, & Hill, 2006)

**Ending question**
Is there anything that we didn’t talk about this <evening, morning> related to litter/trash in this neighborhood? To brownfields in this neighborhood?

*FG: [CO-MODERATOR(s) NAME(s)] is/are going to read us a summary of the key points that she heard emerge from the discussion. I’d like to you listen to the summary,*
and tell me if anything was left out of the summary, or if you have anything that you’d like to clarify or add to the key points before we conclude our discussion.

Co-moderator reads summary – asks if anything was left out, if anyone would like to clarify anything, or add any other key points.

Closing
I want to thank you for taking the time to be part of the group discussion.

Before we conclude, I want to remind you that our discussion is confidential nature of the discussion, so please do not share what was discussed here with anyone after you leave.

Again, we thank you all very much for being part of this discussion. We will now provide you with your gift certificate.
Appendix C: Photos of Brownfield Sites in Weinland Park

Columbus Coated Fabrics Site Before Redevelopment, 2007.
Taken from: [http://static.panoramio.com/photos/original/929421.jpg](http://static.panoramio.com/photos/original/929421.jpg)
Appendix D: Recruitment Materials For Residents

The principal researcher is Dr. Salerno Simons at the Ohio State University College of Nursing.

An invitation for Weinland Park residents

To participate in the study, you must:

- Be 18 years or older living in Weinland Park
- Be able to read, write, and speak English
- Be willing to be part of one discussion group that will last about 1.5 hours
- Fill out an anonymous questionnaire that takes about 5 minutes

You will receive a $50 gift card to a local grocery store

On Our Soil: Brownfields and Litter in Weinland Park

Researchers interested in your opinions about old industrial sites and litter in the Weinland Park area invite adults living in Weinland Park to participate in a discussion group as part of a study.

The purpose of the study is to learn what adults living in Weinland Park think about industrial sites and litter and their impact on health.

If you would like to sign up, please call:

(614) 688-7156
Appendix E: Codebook

Codebook:

**Physiological Domain:**

Agent:

Specific:
- Chemical: TCE, DDT, TCDD, arsenic
- Experiential: Crime, fire, injury, etc.
- Non-specific: “those chemicals,” “stuff on the dust”

Health Effect:
- Specific: cancer, asthma, etc.
- Non-specific: get sick, have problems, etc.

Route of Exposure:
- Specific: inhalation, ingestion, etc.
- Non-specific: “be exposed to it,” etc.

**Health Protection Domain:**

System-level solution: Coming from the government, former business owners, or redevelopers
- Message-based: “They should put up a sign”
- Process-based: “They should tear it down” or “they should go door to door and educate people”

Individual-level solution: Coming from individual actions

**Vulnerability Domain:**

Individual-level characteristics: Age, gender, race, income, occupation, residence, health status, functional status, personal activism, political orientation

Community-level characteristics: Location, poverty, unemployment, home ownership, blight, crime/violence, businesses, green space, community engagement, civic association policies / laws / regulations/system, housing density, event

**Epistemological Domain:**

Scholarly sources: Coming from gov’t reports, agencies, websites, and 311 as well as primary literature and textbooks

Community sources: Coming from friends, family, community orgs, physicians, etc.
Appendix F: Visual Diagram of Coding Scheme