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Analysis of the soil lead contamination issue of South Chattanooga

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Abstract

Childhood lead poisoning is an ongoing health threat despite actions taken by governmental bodies to remove lead from gasoline, paint, and other various household objects in which lead is found. In South Chattanooga specifically, lead has been found in the soil at such a level it is considered a public health threat, especially to children under the age of six. This situation has caused the Environmental Protection Agency (EPA) to name the South Chattanooga area as a Superfund site known as the Southside Chattanooga Lead Superfund site. This designation has resulted in multiple community meetings between EPA officials and Chattanooga residents, as well as door-to-door canvassing and mailing of information to affected households. Despite all of these measures being taken, the awareness levels regarding soil lead contamination in the community has been historically low as shown by previous survey data and data collected through this study. To combat this low awareness level, this study used Community-Based Participatory Research (CBPR) in the community in an attempt to get the community members' insight on how to rectify this issue. While the modified CBPR process was not as effective with this community as hoped, a survey developed and implemented during this study provided useful information from the East Lake community and can be used in the future. Most survey respondents showed similar trends in awareness to what has been found in past surveys with 50% reporting they did not previously know about the lead contamination and 75% reporting they were not asked about testing their soil. In regards to access forms, most had no idea why community members would not sign the forms. Survey data also indicated that community members are more likely to receive news about their neighborhood through television and social media. Using these avenues of information distribution, those working in these areas can better inform affected community members about the situation.

Introduction

Childhood lead poisoning is the leading environmental health threat in the United States, despite the decline of lead in the environment (Centers for Disease Control and Prevention, 2019). Since the 1970s, lead levels found in the air, water, soil, and dust have decreased due to laws being passed by the US government banning lead in paint and gasoline; this has resulted in a notable lowering of blood lead levels (BLLs) in children across the United States (Brown & Margolis, 2012). Despite these measures, childhood lead poisoning is still a prevalent problem--especially since 25% of US children still live in homes with lead-based paint which leads to an increased risk of ingestion of lead either orally via paint chips or soil or through inhalation of air-based lead (American Academy of Pediatrics, 2005). Childhood lead poisoning thresholds set by the Centers for Disease Control and Prevention (CDC) have been set at increasingly lower levels from 60 μg/dL (micrograms per deciliter) in the early 1960s, to 40 μg/dL in 1970, 25 μg/dL in 1985, 10 μg/dL BLL set in 1991, and 5 μg/dL in 2012 as research over time has shown health impacts at lower levels and current literature now states that "there is no safe level of lead exposure" (Gilbert & Weiss, 2006; Vorvolakos et al., 2016).

Having a blood lead level (BLL) ≤5 μg/dL has proven to have detrimental effects on a child's health, despite the CDC considering a BLL ≥5 μg/dL to be the reference level at which action needs to be taken. There are not typically many physical symptoms associated with low levels of exposure, however, there are serious neuropsychological ailments that cause the low BLL to be negatively impactful on a child (Lidsky & Schneider 2006). Canfield, et al. (2003) found that every 1 μg/dL increase in a child's BLL leads to a 1.37-point decline in IQ if the BLL remained ≤10 μg/dL. Studies conducted by Braun, Kahn, Froehlich, Auinger, Lanphear (2006) clearly show that children with BLLs ≥4 μg/dL have an increased risk of suffering with Attention

Deficit Hyperactivity Disorder (ADHD). In fact, studies show that the rate of decrease in IQ is greater at BLLs of ≤10 μg/dL (Canfield, et al, 2003). These statistics show that even "safe" levels of lead in the blood can have drastically negative effects on affected children.

There are several risk factors that cause the likelihood of lead poisoning to increase. One such risk factor is ethnicity. Non-Hispanic black children have a substantially increased risk of having a high BLL when compared to their non-Hispanic white counterparts (Bernard & McGeehin, 2003). For Tennessee specifically, a longitudinal study conducted by Ford, Margaritis, and Mendelsohn (2016) shows that "In examining race... there were more cases in the highest quintile of percent Black in BLL 5.00-9.99 μg/dL." This result helps draw the conclusion that black children may be at a greater risk for lead poisoning due to their housing since it has noted that a large proportion of the central city housing is inhabited by black children (Mahaffey et al., 1982).

Mahaffey's ideas have been propagated by studies that show children in homes with low income are statistically more likely to have lead poisoning; this correlation only grows stronger when the urbanization of their place of residence is taken into account as "the mean blood lead level in young children increased with the degree of urbanization of the areas where they lived" (Mahaffey, Annest, Roberts, & Murphy, 1982). Another risk factor is age, as children less than six years old are at a greater risk of lead poisoning and having elevated BLLs. This risk is due to their hand-mouth behavior and proclivity to be on the floor which exposes them to lead dust (Abelsohn & Sanborn, 2010). Children also more readily absorb lead through their gastrointestinal tract in comparison to adults (Abelsohn & Sanborn, 2010).

To get a proper idea of how lead enters a child's blood, one must understand the variety of lead sources. The main sources are lead-based paint (prominent in pre-1970s houses), soil

(industrial work in the area), and water (pipes with a lead coating). There are many cities across the country with environmental lead contamination such as Milwaukee, Wisconsin, Baltimore, Maryland, Philadelphia, Pennsylvania and Flint, Michigan (Pell & Schneyer, 2016). In the case of Flint, the change of water source caused lead to enter the drinking water which resulted in elevated BLLs to increase from 2.4% to 4.6% in children (Hanna-Attisha, LaChance, Sadler, & Champney, 2016). In South Chattanooga, the lead contamination has been found to be primarily from the soil, however, due to older housing in the areas on the Environmental Protection Agency (EPA) National Priorities List (NPL), paint is also a potential contender for a small percentage of the poisoning cases.

In order to counteract the potential for lead to be ingested by children, the EPA has placed South Chattanooga on the NPL and gave it Superfund site designation for soil lead contamination. This site is known as the Southside Chattanooga Lead Superfund site. Bounds of the site are found in Figure 1. The contamination has been linked to area foundries as historically, “facilities discarded their used foundry waste material on their own properties, sent them to local landfills, or gave them away to be used as fill or as a top soil layer on other properties” (EPA, 2018). With residents having used the contaminated soil in their yards and gardens for years, they have unknowingly exposed themselves and their children to lead and other hard metals.

Figure 1. Chattanooga neighborhoods named by the EPA as lead hotspots leading to inclusion within the NPL site.

By being named a Superfund site, affected areas in South Chattanooga are given the opportunity to have free residential testing and subsequent soil remediation for those properties that exceed the allowable lead threshold of 360 mg/kg. However, many residents are not consenting to have their properties tested which has stalled some of the promised governmental involvement within the crisis. This is evident when looking at soil testing rates throughout the area. As of September 2019, only 1,122 properties have been tested out of 5,483 potentially contaminated properties (Environmental Protection Agency, 2019). Out of the 531 that tested

above the action level threshold, only 131 properties have been remediated (Environmental Protection Agency, 2019).

A relationship between urbanization, socioeconomics, and BLL is especially prominent in the South Chattanooga soil lead contamination crisis. There are several neighborhoods currently involved in the Southside Chattanooga Lead project: Cowart Place, Southside Gardens, Richmond, Alton Park, Oak Grove, East Lake, Highland Park and Jefferson Heights. Of these affected neighborhoods, five out of six have a majority African American demographic: Cowart Place (84.9%), Southside Gardens (83.4%), Richmond (90.5%), Alton Park (88.4%), East Lake (41.7%), and Highland Park (47.9%) (Statistical Atlas, 2018). Jefferson Heights has a demographic with a White majority of 72.4% while Oak Grove has a Hispanic majority of 33.1% (Statistical Atlas, 2018).

It is hypothesized that this refusal to consent could be stemming from low awareness by resident of the soil contamination and the impacts it could have on the health of the children. Several measures have been taken to address the awareness level of residents in the affected neighborhoods. There have been multiple town halls held by the EPA in order to pass along information. Pamphlets have also been handed out by the EPA, Tennessee Department of Health, and Chattanooga-Hamilton County Health Department, but the language used in them seems unfriendly to those not well-versed in technical writing. This has all culminated in a sharp decrease in residents' awareness levels from 2014 to 2017 (Ford, Seay, & Cherian, 2018).

In a longitudinal study conducted in affected neighborhoods over a five-year period, preliminary results show abysmal awareness levels. In 2014, the study conducted in Jefferson Heights resulted in 54 percent awareness level. However, when the study was replicated in Southside Gardens and Cowart Place during 2017, the awareness level was at eight percent. This

is a sharp drop in awareness over the course of three years. This may be due to the amount of people moving in and out of the neighborhoods. Initial studies recently conducted in Alton Park show similar trends of low awareness levels.

The poor reaction from locals to educational outreach done by outsiders is why I believe the South Chattanooga community would be an effective area to trial Community-Based Participatory Research (CBPR) due to its background of activism in the community. CBPR is a research process in which researchers use 'insiders' and their perceptions and knowledge while conducting research (Muhammad, Wallerstein, Sussman, Avila, Belone, & Duran, 2015). Historically, community-based research was primarily conducted under the perceptions of 'outsiders' and it had varying degrees of success as it is difficult for those not entrenched in the community's culture to understand the nuances of their proposed research projects and subsequent 'solutions' (Kerstetter, 2012). CBPR, instead, emphasizes collaboration between researchers and community partners so that it "provides a forum that can bridge across cultural differences among the participants and helps dismantle the lack of trust communities may exhibit in relation to research" amongst other advantages such as "adaptation of existing resources," empowering people to become investigators themselves, and work with "participants who have varied skills, knowledge, and expertise to address complex problems in complex situations" which could lead to solutions that researchers could not have come up with without community input (Holkup, Tripp-Reimer, Salois, & Weinert, 2004).

CBPR has been used in many recent studies of health disparity as well as environmental studies. Wallerstein, Duran, Oetzel, and Minkler (2018) promote CBPR usage as it has been found to "[provide] greater external validity, [challenge] standardized research protocols, and [promote] responsible research conduct" (p.18). This is a valuable tool as vulnerable populations

request that research account for specific community cultures and practices (Wallerstein, et al., 2018).

Johnson, et al.'s 2016 study "Using Community-Based Participatory Research to Explore Backyard Gardening Practices and Soil Lead Concentrations in Urban Neighborhoods" took an environmental issue similar to what the EPA NPL site is facing and integrated CBPR in an attempt to remedy the situation. They adapted the CBPR process to best fit their needs and subsequently noted problems they encountered with the modified version and with their target community. Using the lessons they learned, I would be able to better navigate through community outreach approaches by utilizing CBPR with the South Chattanooga neighborhood I chose to focus my efforts.

The aim of this study is to test whether an adapted version of CBPR would be an effective avenue of research involving the community in South Chattanooga. The best method of information distribution in order to educate the populous will be determined with the adapted CBPR process. It is expected that the South Chattanooga area will be receptive to conducting CBPR to find the best method of lead contamination/poisoning education due to the aforementioned activism in the area and community involvement.

Methodology

Population

The Tennessee Department of Health (TDH) BLL data were used to identify the population for this study. This data set is the number of confirmed elevated BLL cases by zip code for the years 2010-2018. The data were aggregated and sorted by Hamilton County zip codes. The four zip codes found in Table 1 were chosen as potential target neighborhoods as they were the ones with the highest number of children with BLLs in the Superfund site. There were other zip codes in Hamilton County that had higher numbers of children, however, these zip codes were the ones that had the greatest number of lead poisoning cases and also had EPA involvement in the communities. The neighborhoods that were initially chosen for this study were Alton Park (37409, 37410) and East Lake (37404, 37407) due to their history with the EPA Superfund site, with Alton Park having a long history with the EPA and East Lake having a relatively shorter history, and their high BLL rates. This was then funneled down to only focusing surveying efforts in East Lake due to the convenience sampling methodology used while conducting the study.

	Age of Child Tested		
Zip Code	0 to 35 months	36 to 71 months	Total
37404	1345	224	1569
37407	1348	219	1567
37408	126	31	157
37409	167	29	196
37410	480	66	546

Table 1. Number of children screened for blood lead levels with pB >0.0 by zip code, Hamilton County, 2010-2018 total

In East Lake, due to a community connection that was made during the CBPR process, our population was the parents of East Lake Academy of Fine Arts students. East Lake Academy of Fine Arts is a middle school in the center of the target neighborhood (Figure 2). These parents resided in the East Lake neighborhood and many had multiple children, with some of the younger siblings of those attending East Lake Academy.

Figure 2. East Lake Academy's location within the East Lake neighborhood.

Community-Based Participatory Research Protocol

This study was conducted by following an adapted version of Hacker's (2013) Community-Based Participatory Research methodology. The first stage ("Defining the Community, Engaging the Community, Community Needs Assessment, Identifying the Research Question") has several steps such as "Defining and Engaging the Community and Community Needs Assessment," (steps one and two) in which it was determined which neighborhood the focus of the efforts would be on. A one-way analysis of variance (ANOVA) test was conducted through Microsoft Excel and RStudio to find any statistical significance between affected

neighborhoods. Following the ANOVA test, the Bonferroni approach is used and post hoc t-tests are conducted. Results from previous studies about lead contamination awareness, data reported by the EPA about rates of soil testing consent, and the number of cases were also used to determine that Alton Park and East Lake should be the targeted neighborhoods in this study. Along with this, there was an effort to create a community advisory board (CAB) from the community members who have shown interest and engagement in the research (Hacker, 2013). Step three is "Refine the Research Question" which was to be done with the aid of the CAB, however, due to issues with the construction of a CAB, this step was conducted amongst researchers (Hacker, 2013).

Stage two, "Design/Hypothesis Testing, Roles and Responsibilities, Conduct of the Research," has three steps (Hacker, 2013). The design and methods step included the creation of a hypothesis. At this point, the investigatory method of one-on-one interviews via surveying was decided to be the most feasible method given the time constraints on the project. These surveys were conducted at local high schools with parents who were present for a school event. These parents had at least one child over the age of five that attended either East Lake Academy of Fine Arts or East Lake Elementary School. The survey (Appendix A) was developed to depict a holistic view on how community members viewed information distribution and the various methods they have encountered thus far with both the soil lead contamination situation and community-centered events.

The third stage, "Analysis, Interpretation, and Dissemination," is the most crucial stage of the process. This stage originally was to be conducted in tandem with the CAB, however, due to the nature of the methodology changes that occurred, analysis and interpretation were done by the researcher. Thus, the data interpretation may not be understood as intended by survey

respondents. Dissemination will be accomplished through a community presentation such as ReSEARCH Dialogues (Hacker, 2013).

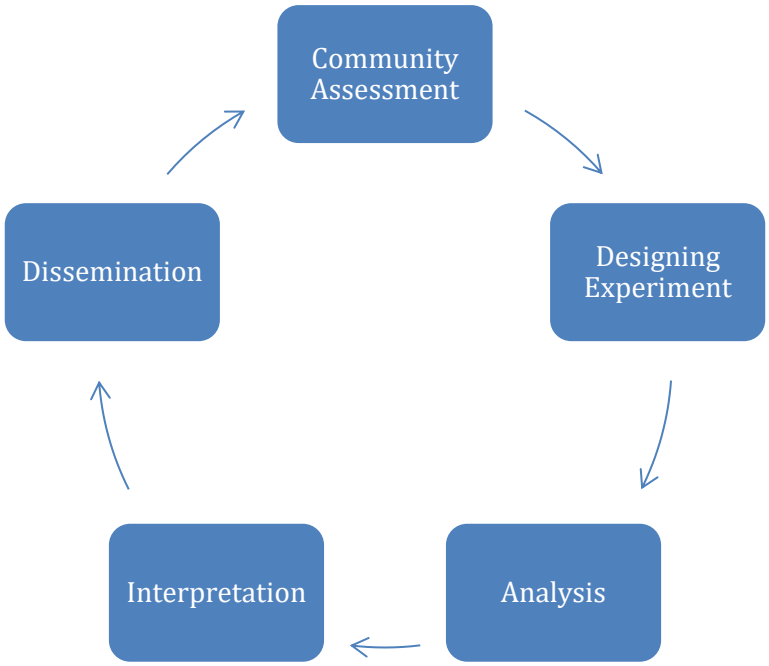

Figure 3. Community Based Participatory Research Flowchart

Survey Methodology

Convenience sampling is a sampling methodology that is vastly used in scientific studies due to its advantages. This method is known to be "cheap, efficient, and simple to implement" even though a disadvantage of convenience sampling is that it lacks blanket generalizability (Jager, Putnick, Bornstein, 2017). Samples collected through convenience sampling are also called 'accidental samples' because the samples are near where the study's data collection is occurring (Etikan, Musa, & Alkassim, 2016). Within developmental science, this methodology is prevalent as 92.5% of the studies, found from five prominent journals, that were determined to have used a sampling strategy were utilizing convenience sampling (Jager et al., 2017).

When using convenience sampling, it is highly encouraged to use a homogenous sample so that there may be clearer generalizability. Homogenous convenience sampling participants are generally selected through an ad hoc process. This ad hoc process is based on the participant's accessibility and/or proximity to research (Jager, et al., 2017). While this process may incur some bias, the significance of the data collected through this methodology is not diminished.

Surveys were conducted face-to-face in an interview format. This allowed interviewers to ask follow up questions to ensure the proper recording of specific answers. Face-to-face surveys also had higher success rates in comparison to phone calls and email chains when I was trialing ways to connect with the survey population. Due to the language barrier with a large portion of the intended population, a translator aided in the surveying.

Survey Questions and Data Analysis

The survey used in this study can be found in Appendix A. The Community Assessment survey is thirteen questions and the questions were free response. Several initial questions specifically asked respondents about the lead contamination in South Chattanooga, however, most of the questions encompassed avenues of information distribution specific to the target neighborhood. The splitting of the question topics allowed for respondents to frame their answers to the latter section of questions to the context of lead contamination in their neighborhoods. This, theoretically, should have led to specific answers that would aid in the development of information distribution hubs around the area, both with location and method.

Data collected through the survey were recorded in Google Sheets spreadsheets and transferred into Microsoft Excel for working offline. Survey results were arranged in numerical order as the surveys had been numbered before being used to better keep track of how many had

been passed out. No increased or decreased weight was given to any surveys as there was no determinate question that would deem the survey more or less valuable to the study.

Ethical Procedures

Institutional Review Board (IRB) approval was obtained from the University of Tennessee at Chattanooga. The survey was deemed IRB exempt under policy 46.104(d)(2)(ii) and was given the approval number IRB #20-013. Participants had to consent to partake in the survey and the consent could be retracted at any time before, during, or after the surveying. Participation was voluntary and no form of compensation for completing the survey was given. No personally identifiable information was collected nor was it included in the data spreadsheets. Data was aggregated and not individually considered as individual responses were not of concern in this study. Only the principal investigators had access to the data. Raw data will be retained for one year with electronic files being deleted and hard copies shredded at the end of the one-year period.

Results

A one-way (single factor) ANOVA test was conducted to compare the effect of zip codes found in Table 1 on BLLs. This resulted in a p-value of 1.89692×10^{-17} which indicates significance at the 95% level. The ANOVA showed that the effect of zip codes on BLL was significant, $F(4,40) = 69.32888$, $p = 1.9 \times 10^{-17}$ (Table 3). Since the one-way ANOVA test only determines if two or more groups tested are different from each other, post hoc t-tests using Bonferroni's method were conducted to compare the zip codes and determine which groups have a difference in means (Table 4) (Singh, 2018). The t-tests show that East Lake zip codes are statistically different from the other Superfund site zip codes. These significant results as well as the number of cases in the area, results from previous studies about lead contamination awareness, and data reported by the EPA about rates of soil testing consent led to the decision to name Alton Park and East Lake as target neighborhoods.

Zip Code	Average Number of Cases (2010-2018)
37404	174.33
37407	174.11
37408	18.44
37409	22.78
37410	60.78

Table 2. Average number of BLL cases per zip code, Hamilton County, 2010-2018.

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	222117.4	4	55529.36	69.32888	1.9×10^{-17}	2.605975
Within Groups	32038.22	40	800.9556			
Total	254155.6	44				

Table 3. One-way ANOVA results from the TDH BLL data set.

(a) Zip Code	(b) Zip Code	Difference in Means	P-value
37404	37407	0.222	0.991
	37408	155.889	9.1×10^{-9}
	37409	151.556	1.53×10^{-8}
	37410	113.556	8.88×10^{-7}
37407	37404	-0.222	0.991
	37408	155.667	1.36×10^{-8}
	37409	151.334	2.27×10^{-8}
	37410	113.334	1.27×10^{-6}
37408	37404	-155.889	9.1×10^{-9}
	37407	-155.667	1.36×10^{-8}
	37409	-4.333	0.270
	37410	-42.333	5.69×10^{-8}
37409	37404	-151.556	1.53×10^{-8}
	37407	-151.334	2.27×10^{-8}
	37408	4.333	0.270
	37410	-38.000	7.19×10^{-7}
37410	37404	-113.556	8.88×10^{-7}
	37407	-113.334	1.27×10^{-6}
	37408	42.333	5.69×10^{-8}
	37409	38.000	7.19×10^{-7}

Table 4. Post hoc t-test results. $p > 0.05$ indicated in red.

Due to the change in interviewing methodology, the sample size of the surveys is at n = 8 after three days of data collection (01/30/20, 02/20/20, 02/27/20). The length, style, and repetitive nature of the survey likely affected the number of respondents who completed the survey as there were a relatively large percentage of individuals who were interested in participating but revoked their consent at various points during the surveying. The free-response style questionnaire along with the daunting task of answering three front-and-back pages of them turned away many potential participants.

Question one, which assesses the respondent's prior knowledge regarding the soil lead contamination in East Lake, had the result of 37.5% of respondents saying they had prior knowledge and 50% saying they did not (Figure 4). Question three asks whether respondents have had a chance to fill out an EPA access form with an overwhelming number of respondents (75%) saying they have not been asked about access forms (Figure 5). Question five asked respondents why they would sign the access form if given one and a majority responded saying they need to know if they and their children are okay. However, when question six "Why might you not sign the form?" was asked, all but one response was along the lines of "I don't know." One respondent indicated that refusal to sign the access form might be due to a lack of interest in getting their yards tested.

Answers from questions 7, 7a, and 7b suggest that community members receive information about their neighborhood mostly from television and social media while results from question 10 concur with this finding as most respondents cite seeing television and social media the most in terms of information distribution methods.

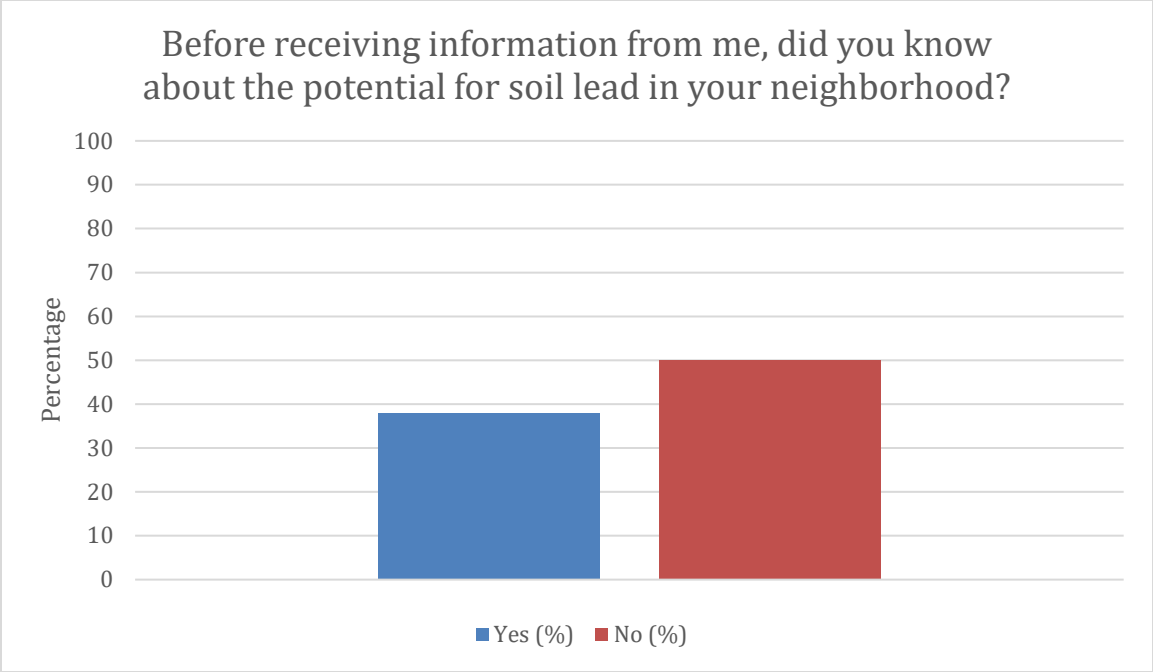

Figure 4. Results from Question 1. Percentages do not add up to 100% due to some respondents not answering the question.

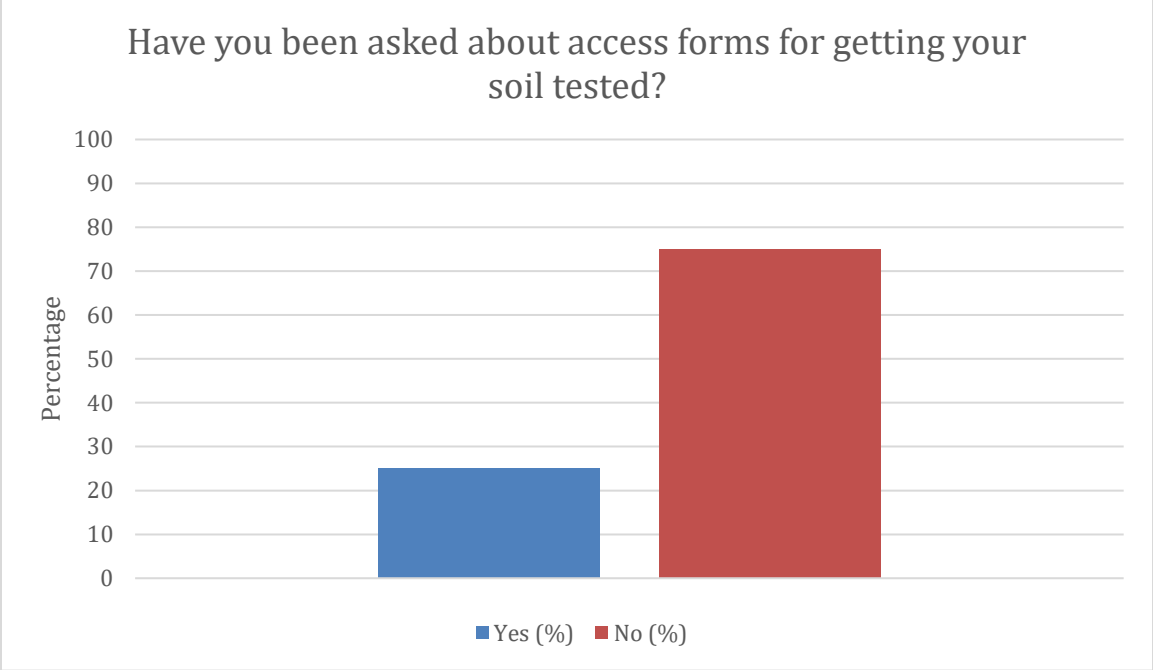

Figure 5. Results from Question 3.

Discussion

Interpretation of Findings

The purpose of this study was to determine whether South Chattanooga would be an appropriate location for CBPR to be conducted, to find what method of information distribution for education about the lead contamination would work best for this particular community, and which method of information distribution would be most effective. After the determination that Alton Park and East Lake would be the most accessible to conduct CBPR in following an ANOVA analysis and preliminary conversations with potential CAB members, I followed the steps of CBPR and found that the community response to this type of project was less than expected. This caused us to accept the null hypothesis regarding CBPR in South Chattanooga and switch tactics to test the second part of the hypothesis. For this, I surveyed a specific population of parents in East Lake in regards to their prior knowledge of lead contamination in their neighborhood and how they receive news and other information.

The survey results indicate that a majority of participants had no prior knowledge about soil lead contamination in East Lake which is both a positive and negative. This shows that most of the survey respondents could not understand or were not given information from the EPA about the addition of East Lake into the Superfund site. However, this confirms our initial suspicions that East Lake would be a prime area in which to conduct CBPR to determine the best methods of distributing information regarding lead contamination and blood lead testing. Findings from the second part of the survey indicate that social media and news stations would be the best way to spread information in the East Lake neighborhood.

Outcomes

This process began with me conducting a one-way ANOVA analysis of the TDH's pediatric blood lead data and consequent t-tests. The analysis led to the realization that East Lake's zip codes had a significantly different amount of elevated BLLs in comparison to all the zip codes in the affected area. The lack of statistical significance indicates that, amongst the zip codes within the EPA designated contamination zone, none of them had more elevated BLL cases in comparison to the other affected zip codes. Non-significance may also be a result of low lead screening levels (17.7%) throughout Tennessee (Zheng & Li, 2018). However, the Alton Park and East Lake neighborhoods had a higher number of elevated BLL cases, possibly due to a larger population, with varying amounts of previous knowledge regarding the soil lead contamination, with East Lake having the least knowledge. Because of East Lake's recent addition to the Superfund site and the lack of interest from community members in Alton Park, East Lake was designated to be the target neighborhood for CBPR.

The CBPR process began with me reaching out to a contact I previously had since she was well connected in Alton Park. This contact sent me the contact information for several important community members in the area who could potentially be an asset to my research. Unfortunately, all of these contacts fell through several months into the project leading to issues in the continuation of the CBPR process. Following this, I reached out to several other community members that either had interest in this topic or knew others around the area and could spread word about my project. These also fell through. After this, I had to switch methodologies and focus on surveying individuals in the East Lake community instead of attempting to create a CAB with Alton Park community members and proceeding with the rest of the outlined CBPR protocol.

As previously mentioned, this project aided in the discovery that there is a high probability that South Chattanooga is not as open to CBPR as it was initially believed to be. This may be due to many different factors stemming from the researcher, methods of reaching out, community members that were contacted, and/or other various issues that interfered with properly enacting the proposed CBPR process. Despite this, through this project it was found that there was more openness from community members when talking about the soil contamination. It is likely that this may be due to talking to them in an area that is comfortable to them, as in the school. This led to obtaining four signed Access Authorization forms from East Lake residents that were sent to the EPA in Atlanta.

Stage three of CBPR, which was not originally modified with the original adaptations, did have to be modified in the face of the COVID-19 pandemic as ReSEARCH Dialogues and other potential avenues of disseminating this information into the community through presentations have been cancelled. While the preliminary study encompassing CBPR in its entirety had to be heavily modified in response to community response, the information gleaned from the surveys can be taken forward in further lead-based work in this area.

Limitations

One limitation to this study was the sampling methodology. Convenience sampling is one of the most used methods of surveying, however, there are many disadvantages with this method as the generalizability of the results may not be a proper reflection of the population's ideals. With convenience sampling, a homogeneous sample is what is needed to offset bias and generalizability issues, however, due to the sample size limitation, it cannot be accurately stated that this study used a homogenous convenience sample (Jager, et al., 2017).

Another limitation was the small sample size. With convenience sampling, researchers have to be careful in claiming whether or not sampling results are indicative of the population. The small sample size in this study requires further caution be used in saying the findings are representative of the target population. With the size n = 8, statistical significance may not be present which poses issues with blanket statements and claims about the accuracy of the data retrieved.

The largest limitation in this study had to be the amount of process modifications that had to be done to reflect the feedback that was given in the form of a lack of community interest, difficulty navigating social networks, and getting in contact with interested individuals. The original time commitment that was asked of those interested in joining the CAB was greatly decreased to ease the requirements. Unfortunately, that did not increase any interest and plans had to be changed to encompass a survey and not a CAB. With all these changes, the CBPR process became diluted and was not fully used, leading to the null hypothesis to test true.

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Appendix A

Community Assessment Survey

1. Before receiving information from me, did you know about the potential for soil lead in your neighborhood?
    a. If yes, who/how/where did you hear it from?

2. What other kinds of information would you want about lead in the soil?

3. Have you been asked about access forms for getting your soil tested?
    a. If so, by whom?

4. What information would you want before you signed such a form?

5. Why might you sign the form?

6. Why might you not sign the form?
    a. [Address their concerns]

7. How do you get most of your news?
    a. How do you get most of your news about the area you live in?
    b. How do you learn about neighborhood events?

8. Do you get information from a local community group you are a part of such as your child's school, a church, work, clubs?

9. Is there a place you know you could go to to get information about neighborhood information and events, such as a Facebook page, church, local grocery store, library?
    a. If so, where?
    b. If not, where do you think would be a good place to start one?

10. What method of information distribution do you see most often (ex. flyers, newspaper, TV, social media)?
    a. Which method do you use most often to find out what is happening around you?
    b. Which method do your friends use most often to find out what is happening around them?

11. Knowing your community, what method of information distribution do you believe people would pay the most attention to?

12. What kind of events do people participate in the most in your opinion?

13. What about the event do you think convinces them to go?