DISPROPORTIONATE ENVIRONMENTAL IMPACTS AND RECOVERY RELATED GROUP HOMES

by

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Julie Bacon

Environmental justice research has shown that different marginalized populations in the United States have been disproportionately impacted by environmental harms. Most of the research and policy has focused on ethnic minority and low income groups. None of the research has focused on populations in recovery from addiction. Using a linear regression model, I show that there is a positive correlation between higher cancer risk, lead paint exposure, and respiratory hazard index, and having an Oxford House located in a census block group in both Washington D.C. and Pennsylvania. Oxford Houses are Level I recovery residences, and house persons in early recovery from addiction and alcoholism and their families. Being at a higher risk for health impacts could be a detriment to people seeking recovery from addiction. This was a pilot study with two areas of research showing a positive correlation between sober living houses being located in areas with higher rates of cancer, lead paint, and respiratory hazards; more research is warranted.

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Environmental Impacts on Sober Living

Abstract

Environmental justice research has shown that different marginalized populations in the United States have been disproportionately impacted by environmental harms. Most of the research and policy has focused on ethnic minority and low income groups. None of the research has focused on populations in recovery from addiction. Using a linear regression model I show that there is a positive correlation between higher cancer risk, lead paint exposure, and respiratory hazard index, and having an Oxford House located in a census block group in both Washington D.C. and Pennsylvania. Oxford Houses are Level I recovery residences, and house persons in early recovery from addiction and alcoholism and their families. Being at a higher risk for health impacts could be a detriment to people seeking recovery from addiction. This was a pilot study with two areas of research showing a positive correlation between sober living houses being located in areas with higher rates of cancer, lead paint, and respiratory hazards; more research is warranted.

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Introduction

The expansion of environmental justice research has brought to light revelations about the relationship of different systems of society with environmental harms. For example, it has been shown through several studies and instances that militarism is connected with disproportionate environmental impacts[1]; militarism has been linked clearly to environmental hazards[2]. For example depleted uranium (DU) weapons were developed by the Pentagon in the late 1970s as anti-tank armor-piercing shell[3]. DU is a radioactive by-product of the enrichment process used to make nuclear fuel rods and nuclear bombs[4]. Not only has the United States used depleted uranium during the war in Iraq, but they refuse to tell the government of Iraq where it was used[5]. Recently the United States admitted to using the weapon in Syria[6].

Domestic populations have also been impacted environmentally by the effects of militarism. Marines and their families stationed at camp Lejeune from at least 1957 through 1987 bathed in and drank water that was highly contaminated at concentrations 240 to 3400 times safety standards, due to the negligent practices of the military[7].

The United States continues the war on drugs. This fact makes drug users a target for domestic para-military forces. Meanwhile there is a prescription opioid addiction phenomenon

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[1] Deborah Berman Santana. "Resisting Toxic Militarism: Vieques versus the U.S. Navy." *Social Justice* 29, no. 1/2 (2002): 37-47.
[2] Havlick, David. "DISARMING NATURE: CONVERTING MILITARY LANDS TO WILDLIFE REFUGES*." *Geographical Review* 101, no. 2 (2011): 183-200.
[3] Birchard, Karen. "Does Iraq's Depleted Uranium Pose a Health Risk?" *The Lancet* 351, no. 9103 (1998): 657.
[4] Environmental Pollution by Depleted Uranium in Iraq with Special Reference to Mosul and Possible Effects on Cancer and Birth Defect Rates
[5] Fathi, Riyad, Lilyan Matti, Hana Al-Salih, and Douglas Godbold. "Environmental Pollution by Depleted Uranium in Iraq with Special Reference to Mosul and Possible Effects on Cancer and Birth Defect Rates." *Medicine, Conflict and Survival* 29, no. 1 (2013): 7-25.
[6] Samuel Oakford. Foreign Policy. http://foreignpolicy.com/2017/02/14/the-united-states-used-depleted-uranium-in-syria/. (Last accessed on 3/22/2017)
[7] National Research Council . Committee on Contaminated Drinking Water at Camp Lejeune, Issuing Body. *Contaminated Water Supplies at Camp Lejeune : Assessing Potential Health Effects*. Washington, D.C.: National Academies Press, 2009.

which has been described as an epidemic in the United States[8]. Those individuals seeking recovery from addiction are at a statistical disadvantage to do so, but a main predictor in their success is access to "recovery capital" which includes inpatient treatment and a sober living environment[9]. According to Polcin, and other experts in the field, a person without a stable and sober environment to live in is much less likely to recover from addiction. The need for a stable sober living environment has largely been answered by sober living homes (either non-profit or for-profit) that provide varying degrees of services offered and staffing[7]. There are four levels of recovery residences. All levels require complete abstinence from members and require the members to practice some sort of recovery program, but differ in levels of supervision, professional staff, and administration. Level I houses are democratically run by the residents, offer no professional staff, are located in residential neighborhoods, and offer no on-site services[7]. Level IV houses provide on-site services administered by professionals, and are typically licensed and larger than level I houses[7].

Although such sober living environments, which often function as group homes, provide a valuable service to the community they can be met with local resistance and subjected to zoning and licensing practices. According to the National Association of Recovery Residences individuals in recovery are protected under the Fair Housing Act but due to fears resulting from stigma there are still widespread housing discriminations at local and state levels[10]. Prior to opening in a residential area group homes can be subject to fierce opposition from Not-In-My-

[8] Nelson, Lewis S, David N Juurlink, and Jeanmarie Perrone. "Addressing the Opioid Epidemic." *JAMA* 314, no. 14 (2015): 1453-4.
[9] Polcin, Douglas L, Amy A Mericle, Sarah Callahan, Ronald Harvey, and Leonard A Jason. "Challenges and Rewards of Conducting Research on Recovery Residences for Alcohol and Drug Disorders." *Journal of Drug Issues* 46, no. 1 (2016): 51-63.
[10] National Alliance for Recovery Residences. Advocacy. https://narronline.org/affiliate-services/advocacy/. (Last accessed on 2/26/2017).

Backyard (NIMBY) organizations and may be forced to move into less desirable neighborhoods[11].

The question of Environmental Justice's relationship to the concept and implementation of NIMBY is an interesting one to consider. Unlike national environmental organizations, environmental justice groups, and NIMBY groups are both involved in local pollution politics[12]. NIMBY is similar to Environmental Justice in that they are locally organized, and they are "unwilling to accept the reassurances of technical experts and government officials"[11]. The NIMBY activists are different though, they are not predominantly concerned with Civil Rights or environmentalism, they are "the same middle-class, concerned citizens who might protest a new freeway extension or adult book store"[11]. It seems the two groups have the same goal of acting locally to keep polluting industries out of their neighborhoods, however the groups may actually be in opposition. In fact, a key distinction between the two groups is that NIMBY organization may even view marginalized communities such as homeless people, or a recovery related group home as a form of pollution[13].

While research in the realm of environmental justice has broadened, it is mainly still confined to the United States and related to distributional aspects of environmental harms[14]. Most research has focused on the relationship between environmental harm exposure and race, income level, and education level but other studies have analyzed and found a positive correlation for other intersections of social stratification. For example one study analyzed, among

[11] National Alliance for Recovery Residences. A Brief Primer on Recovery Residences: FAQs. http://narronline.org/wp-content/uploads/2014/06/Primer-on-Recovery-Residences-09-20-2012a.pdf. (Last accessed on 2/26/17)
[12] Lowry, RC. "All Hazardous Waste Politics Is Local: Grass-roots Advocacy and Public Participation in Siting and Cleanup Decisions." *Policy Studies Journal* 26, no. 4 (1998): 748-59.
[13] Bonds Eric and Martin Leslie. Environmental Justice. October 2016, 9(5): 137-141. doi:10.1089/env.2016.0021.
[14] Reed, Maureen G, and Colleen George. "Where in the World Is Environmental Justice?" *Progress in Human Geography* 35, no. 6 (2011): 835-42.

other things, a person's age as a factor contributing to relative proximity to unconventional gas wells[15].

Currently no research has been done into whether being in recovery from addiction, or living in a recovery residence, has an influence on relative proximity to environmental harms or a lack of access to environmental benefits.

It is my goal to research the influence that the marginal identity factor of living in a recovery home from addiction has on issues of environmental justice. With the stigma and discrimination, presence of militarism, and NIMBYism it is my hypothesis that recovery houses will be disproportionately impacted by environmental harms.

I have used an environmental justice paradigm and EPA data to assess a possible disproportionate impact of harm to recovery residences. I have looked at recovery residences in both Washington D.C. and Pennsylvania, and assessed some of their risk factors by using the EJSCREEN data file for 2016, located on the EPA's website. I chose Pennsylvania as a study area because they have been fairly progressive with environmental justice policy, and even have an Office of Environmental Justice in their state government. I chose Washington D.C. as a study area because Oxford House is headquartered there. I focused my attention on Oxford Houses in the two areas.

Oxford Houses would be considered a level I recovery residence. They function by renting residential properties from land lords or property management companies. They are not subject to licensing or zoning, but they have been the subject of controversy and participated in

[15] Ogneva-Himmelberger, and Huang. "Spatial Distribution of Unconventional Gas Wells and Human Populations in the Marcellus Shale in the United States: Vulnerability Analysis." *Applied Geography* 60 (2015): 165-74.

court battles with NIMBY organizations and municipalities, even winning cases in the supreme court[1617]. In the case of City of Edmonds v. Oxford House, the City of Edmonds, like many municipalities, tried to use zoning practices to move Oxford House into less desirable neighborhoods. Oxford House saw these practices as discriminatory. The case was eventually decided in the supreme court, where Oxford House's contention that the zoning practices were a violation of both the Fair Housing Act, and the Americans with Disabilities Act, and that for the purposes of zoning, Oxford House was to be considered a single family residence. I chose these houses in particular because they are a large network, with an excellent track record of best practices according to the Substance Abuse and Mental Health Administration's endorsement, and they also have a large amount of publicly available data, like the address for each house and a yearly report of their demographics.

Discussion

I started by analyzing the percentile that each house falls into nationally with relative exposure to cancer risk, respiratory hazard index, superfund proximity, hazardous waste site proximity, and led paint exposure. The distribution for block groups with Oxford Houses located in them were skewed to a high percentile for cancer risk, lead paint exposure, and respiratory hazard index when compared to national and state levels. The distribution for superfund site proximity and hazardous waste site proximity showed no significant relationship.

Cancer risk information is based on the national-scale assessment (NATA) of air toxic emissions for 2011 and shows the lifetime cancer risk from inhalation of air toxins[18]. The

[16] City of Edmonds v. Oxford House Inc, 514 U.S. 725 (1995).
[17] Oxford House, Inc. v. City of Wilmington, N.C., 2010, United States District Court, E.D. North Carolina, Southern Division, WESTLAW (2010).
[18] EPA. EJSCREEN. ftp://newftp.epa.gov/EJSCREEN/. (Last accessed on 2/26/17)

Respiratory Hazard Index is also based on NATA and shows "ratio of exposure concentration to health-based reference concentration"[18]. Superfund Proximity is calculated by the "Count of RMP (potential chemical accident management plan) facilities within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers," and based on the EPAs list of RMP sites from 2015[18]. The Hazardous Waste Site Proximity is calculated by the "Count of TSDFs (hazardous waste management facilities) within 5 km (or nearest beyond 5 km), each divided by distance in kilometers" and "Calculated from EPA's Resource Conservation and Recovery Act (RCRA) Info database, retrieved 08/16/2016"[18]. Lead paint exposure is calculated "Percent of housing units built pre-1960, as indicator of potential lead paint exposure" using information from "Census/American Community Survey (ACS) data, retrieved 2015"[18]. I got the addresses for the houses in Washington D.C. and Pennsylvania from the Oxford House Directory[19]. I cross referenced the addresses with the census block group they are located in using the EJScreen tool available on the EPAs website, and compiled information from every house in both areas to analyze the health risks associated with living in recovery houses based on the data[20]. I then created a new column in the .csv file listing the number of Oxford Houses located in each census block group.

[19] Oxford House Inc. Directory. http://www.oxfordhouse.org/directory.php. (Last accessed on 2/26/17).
[20] EPA. EJSCREEN Tool. https://ejscreen.epa.gov/mapper/. (Last accessed on 2/26/17).

Model 1

Impacts on Both Areas

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Cases of cancer per lifetime per million	0.028***	0.025***	0.025***
	(0.004)	(0.005)	(0.005)
Percent Minority		1.632***	1.596***
		(0.312)	(0.387)
Percent Low Income			0.097
			(0.612)
Constant	-6.237***	-6.724***	-6.744***
	(0.236)	(0.316)	(0.340)
Observations	10,182	10,182	10,182
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 1: Cancer Risk, Washington D.C. and Pennsylvania, Controlling for Percent Minority and Percent Low Income[21]

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Percent pre-1960	0.031***	0.023***	0.023***
	(0.005)	(0.006)	(0.006)
Percent Minority		1.372***	1.396***
		(0.325)	(0.377)
Percent Low Income			-0.077
			(0.610)
Constant	-6.937***	-6.890***	-6.873***
	(0.417)	(0.407)	(0.428)
Observations	10,190	10,190	10,190
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 2: Lead Paint Exposure, Washington D.C. and Pennsylvania, Controlling for Percent Minority and Percent Low Income[18]

[21] Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables. R package version 5.2. http://CRAN.R-project.org/package=stargazer

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Respiratory hazard index	0.816***	0.734***	0.736***
	(0.080)	(0.093)	(0.093)
Percent Minority		1.155***	1.010**
		(0.330)	(0.404)
Percent Low Income			0.373
			(0.600)
Constant	-6.746***	-7.009***	-7.101***
	(0.253)	(0.292)	(0.329)
Observations	10,182	10,182	10,182
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 3: Respiratory Hazard Index, Washington D.C. and Pennsylvania, Controlling for Percent Minority and Percent Low Income [18]

Using a poisson generalized linear model I then modeled the expected number of Oxford Houses in a block group in both Washington D.C. and Pennsylvania, as a function of environmental hazards and other demographic indicators. Cancer risk, lead paint exposure, and respiratory hazard index all showed a positive relationship with the number of Oxford Houses in a block group. Superfund and hazardous waste site proximity did not show a statistically significant relationship. The model predicted that for each additional lifetime case of cancer per lifetime per million per block group, the number of expected Oxford Houses within that block group increases by 2.8%. Controlling for both minority percentage and low income percentage, that number decreased to 2.5%. A similar model, analyzing lead paint exposure based on the percentage of homes in the area built before 1960, predicted that for each 1% increase in pre-1960 homes, the expected number of Oxford Houses in the block group increases by 3.1%.

Controlling for both minority percentage and low income percentage, that number was 2.3%. In another model, analyzing scale on the respiratory hazard index, it was predicted that for each additional point on the index, the expected number of Oxford Houses located in the block group increase by 126%, and 108% when controlling for both minority percentage and low income percentage. All effects are statistically significant.

Similar numbers emerged when running the models using the data from Pennsylvania only. The models run using the data for Washington D.C. did not show a statistically significant relationship between the number of Oxford Houses and environmental impacts.

Model 2

Impacts on Pennsylvania Only

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Cases of cancer per lifetime per million	0.025***	0.024***	0.021***
	(0.005)	(0.006)	(0.006)
Percent Minority		0.803*	-0.603
		(0.428)	(0.541)
Percent Low Income			3.335***
			(0.764)
Constant	-6.498***	-6.656***	-7.515***
	(0.308)	(0.351)	(0.433)
Observations	9,732	9,732	9,732
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 4: Cancer Risk, Pennsylvania, Controlling for Percent Minority and Percent Low Income[18]

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Percent pre-1960	0.033***	0.031***	0.027***
	(0.007)	(0.007)	(0.008)
Percent Minority		0.328	-0.706
		(0.435)	(0.518)
Percent Low Income			2.979***
			(0.805)
Constant	-7.501***	-7.475***	-8.171***
	(0.540)	(0.537)	(0.593)
Observations	9,740	9,740	9,740
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 5: Lead Paint Exposure, Pennsylvania, Controlling for Percent Minority and Percent Low Income[18]

	Dependent variable:		
	Number of houses		
	(1)	(2)	(3)
Respiratory hazard index	0.748***	0.721***	0.678***
	(0.112)	(0.120)	(0.125)
Percent Minority		0.412	-0.962*
		(0.444)	(0.549)
Percent Low Income			3.208***
			(0.752)
Constant	-6.886***	-6.956***	-7.785***
	(0.315)	(0.335)	(0.412)
Observations	9,732	9,732	9,732
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 6: Respiratory Hazard Index, Pennsylvania, Controlling for Percent Minority and Percent Low Income[18]

Conclusions

While other forms of militarism show somewhat obvious signs of environmental damage, like depleted uranium left behind on battlegrounds or jet fuel leaking into the water supply at a military base, domestic populations subject to domestic militarism (like the war on drugs) may still be impacted by that militarism environmentally in ways that are less clear. There is a positive relationship between block groups containing Oxford Houses in the areas researched and an increase of cancer risk, respiratory hazards, and lead paint exposure, even when controlling for both minority population and low income which are factors that are known to cause these impacts. This study fails to disprove the hypothesis. I am now more confident that residents of recovery houses are disproportionately by environmental harms.

Although when it was separated from the rest of the data, the information pertaining to the relationship between Oxford Houses in Washington D.C. and environmental harms did not show statistically significant relationship. This information still doesn't disprove the hypothesis. Washington D.C. is a much smaller area of research, and is more comparable to a major city than to a state. It also turns out that Washington D.C. is a relatively toxic place to live for all of its residents. During preliminary analysis of the data, block groups containing Oxford Houses were in a high percentile for all relevant environmental impacts when compared to the national levels. When compared to Washington D.C. levels, the percentile rankings were insignificant. So the fact that the Oxford Houses in Washington D.C. did not show a significant relationship between the location of the houses and environmental impacts when comparing only to other block groups in Washington D.C. may have more to do with the nature of Washington D.C. than with the nature of the relationship between Oxford Houses and disproportionate environmental harms.

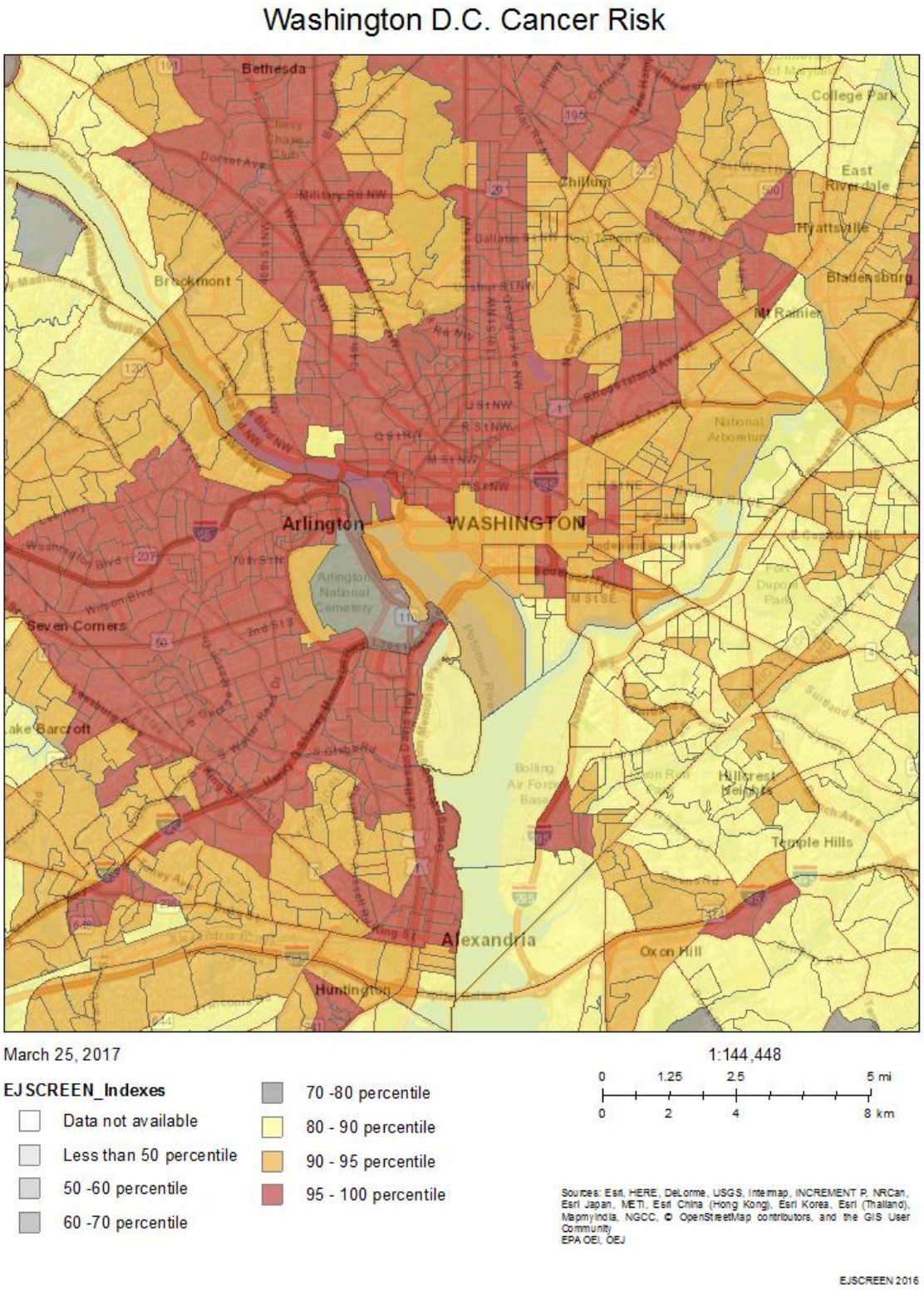
More research is warranted but if these findings hold up, there are serious implications. With people in early recovery, and their dependents, already being at an increased risk for ill health, delinquency, and poor academic performance, compounding factors like lead paint exposure, and respiratory hazards may be a further hindrance to recovery. In addition to already having been shown to disproportionately impact marginalized communities in America, lead paint and respiratory hazard exposure have both been shown to reduce academic performance[2223]. Furthermore, making organizations aware of the increased risk of being exposed to these factors may lead to risk mitigation, such as educating residents in pre-1960 houses on how to safely live in a house with lead paint.

Marginalized identities, like being in recovery from addiction, seem to have an impact beyond basic civil rights today in America. Real world consequences of stigmatization, and domestic militarization, seem to involve direct impacts on individual health through the work of NIMBY organizations to locate services for these communities as well as environmental harms in neighborhoods other than their own. When a NIMBY organization is successful in keeping a polluting industry out of their neighborhood, it can wind up in a neighborhood with less political strength, like a minority community. When they are successful in keeping an unwanted population out of their neighborhood, that population may just wind up in the same area as the environmental harm. Even an organization like Oxford House Inc, who has put up a tremendous legal battle for civil rights, is shown to be subject to this paradigm. NIMBYism could even be

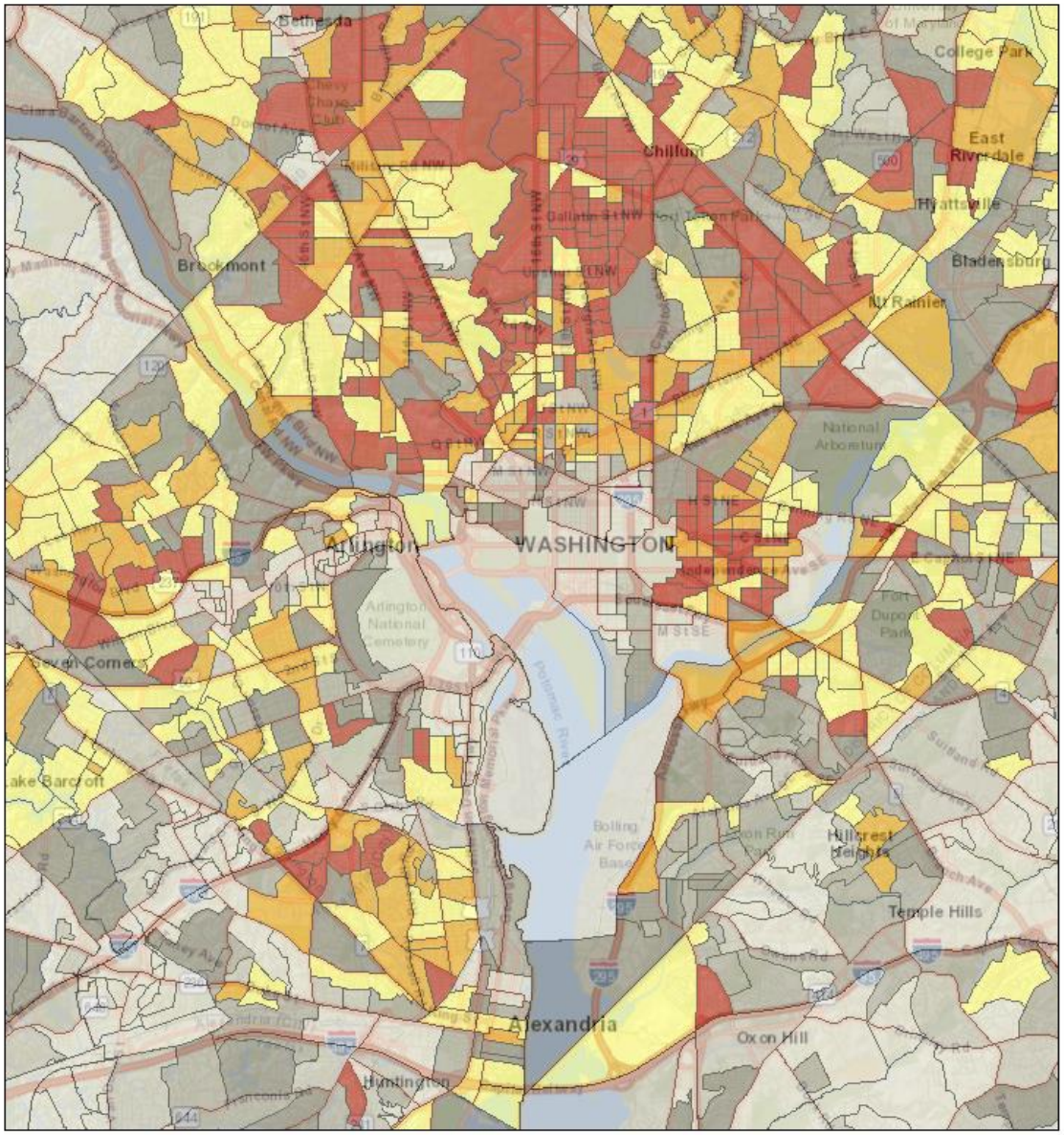
[22] Grineski, Clark-Reyna, and Collins. "School-based Exposure to Hazardous Air Pollutants and Grade Point Average: A Multi-level Study." *Environmental Research* 147 (2016): 164-71.
[23] Chandramouli, K., C D Steer, M. Ellis, and A M Emond. "Effects of Early Childhood Lead Exposure on Academic Performance and Behaviour of School Age Children." *Archives of Disease in Childhood* 94, no. 11 (2009): 844-8.

seen as a root cause of environmental injustice, and environmental justice advocates may do well to begin fighting the actions of NIMBY organizations at local levels.

Appendix A: EJSCREEN Maps



Washington D.C. Lead Paint Exposure



March 25, 2017

1:144,448

0 1.25 2.5 5 mi

0 2 4 8 km

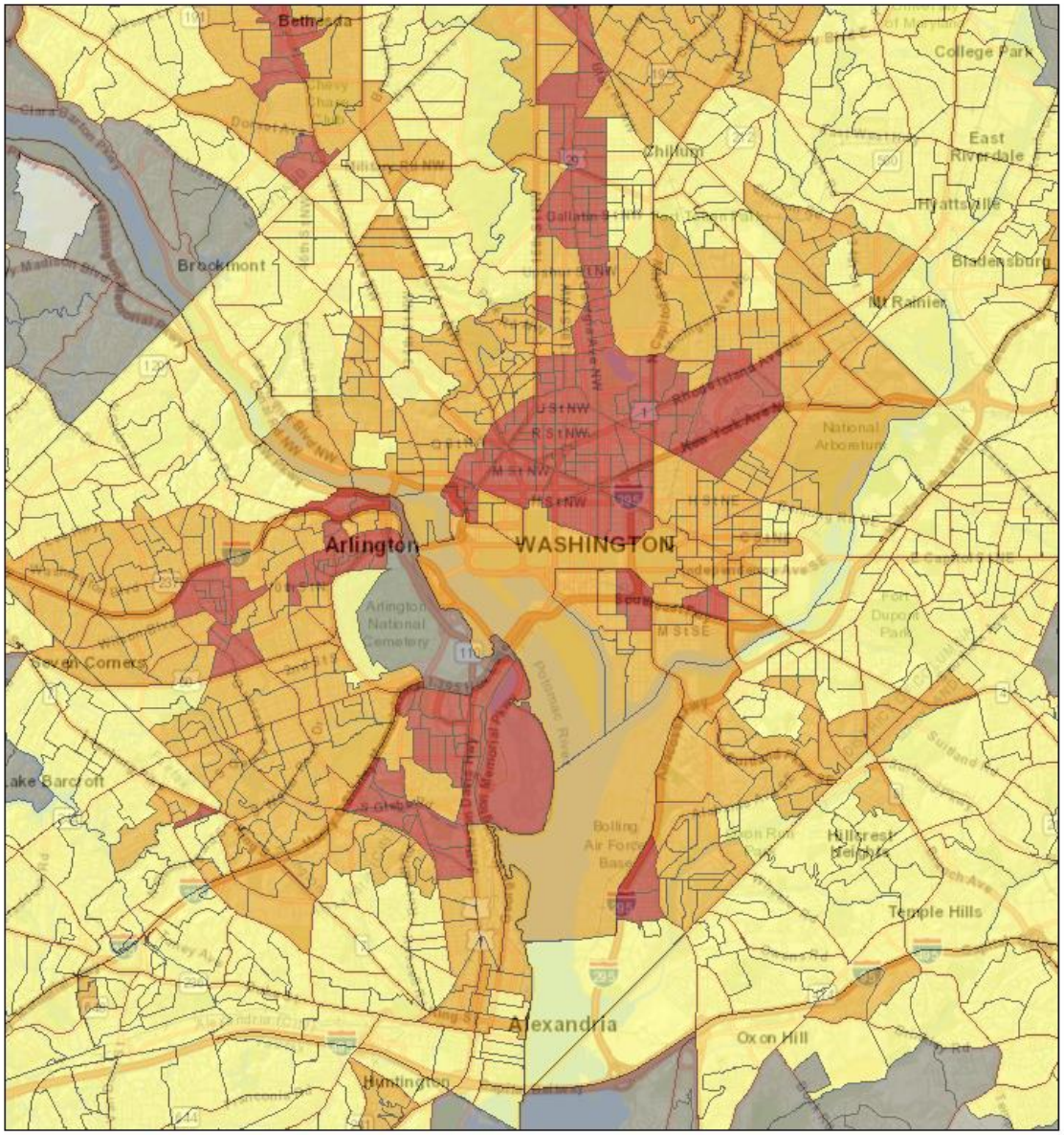
EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
EPA OEI, OEJ

EJSCREEN 2016

Washington D.C. Respiratory Hazard Index



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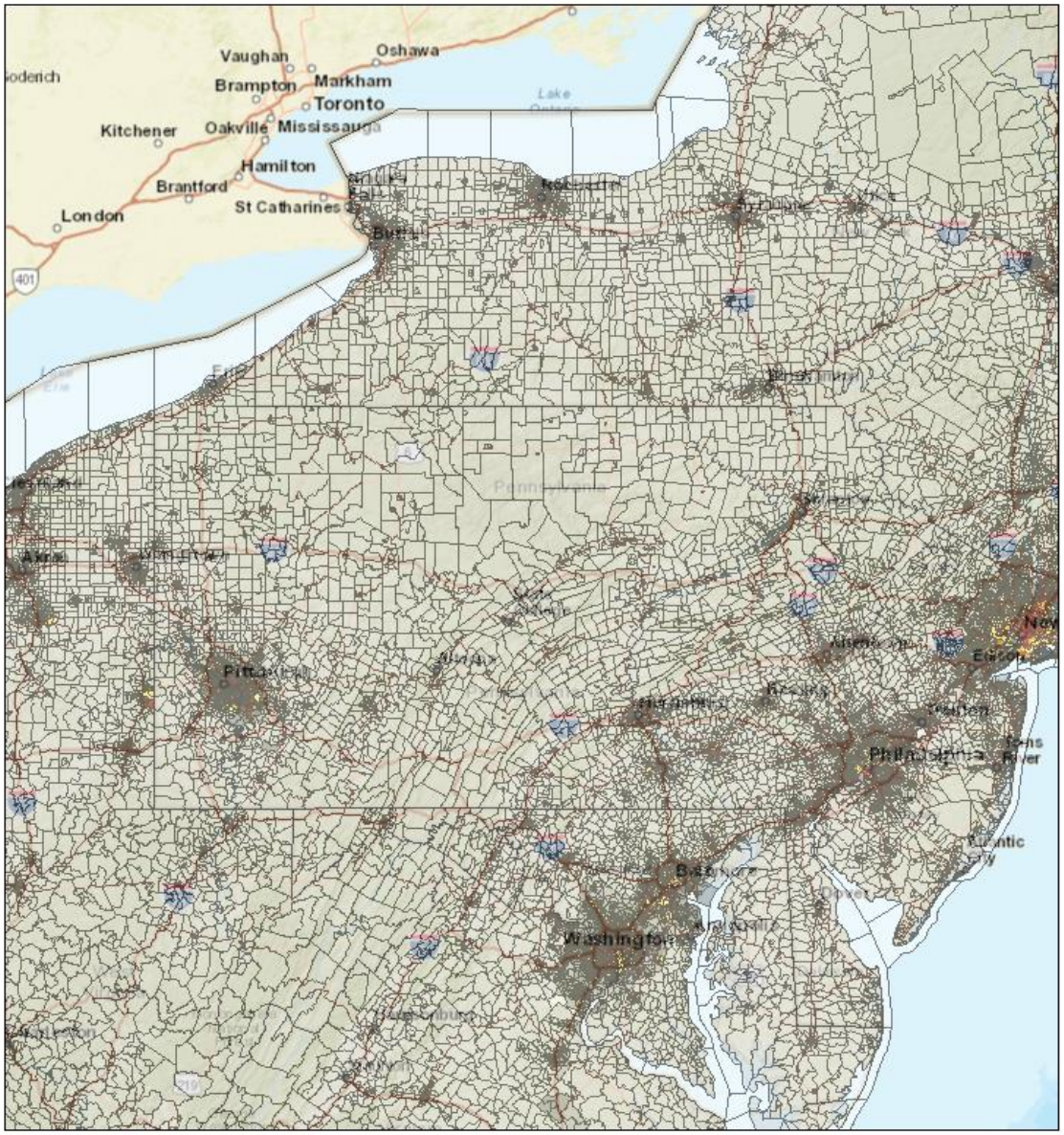
EPA OEI, OEJ

EJSCREEN 2016

Pennsylvania Cancer Risk



March 25, 2017

1:4,622,324

0 37.5 75 150 mi
0 62.5 125 250 km

EJSCREEN_Indexes

- Data not available
- Less than 50 percentile
- 50 -60 percentile
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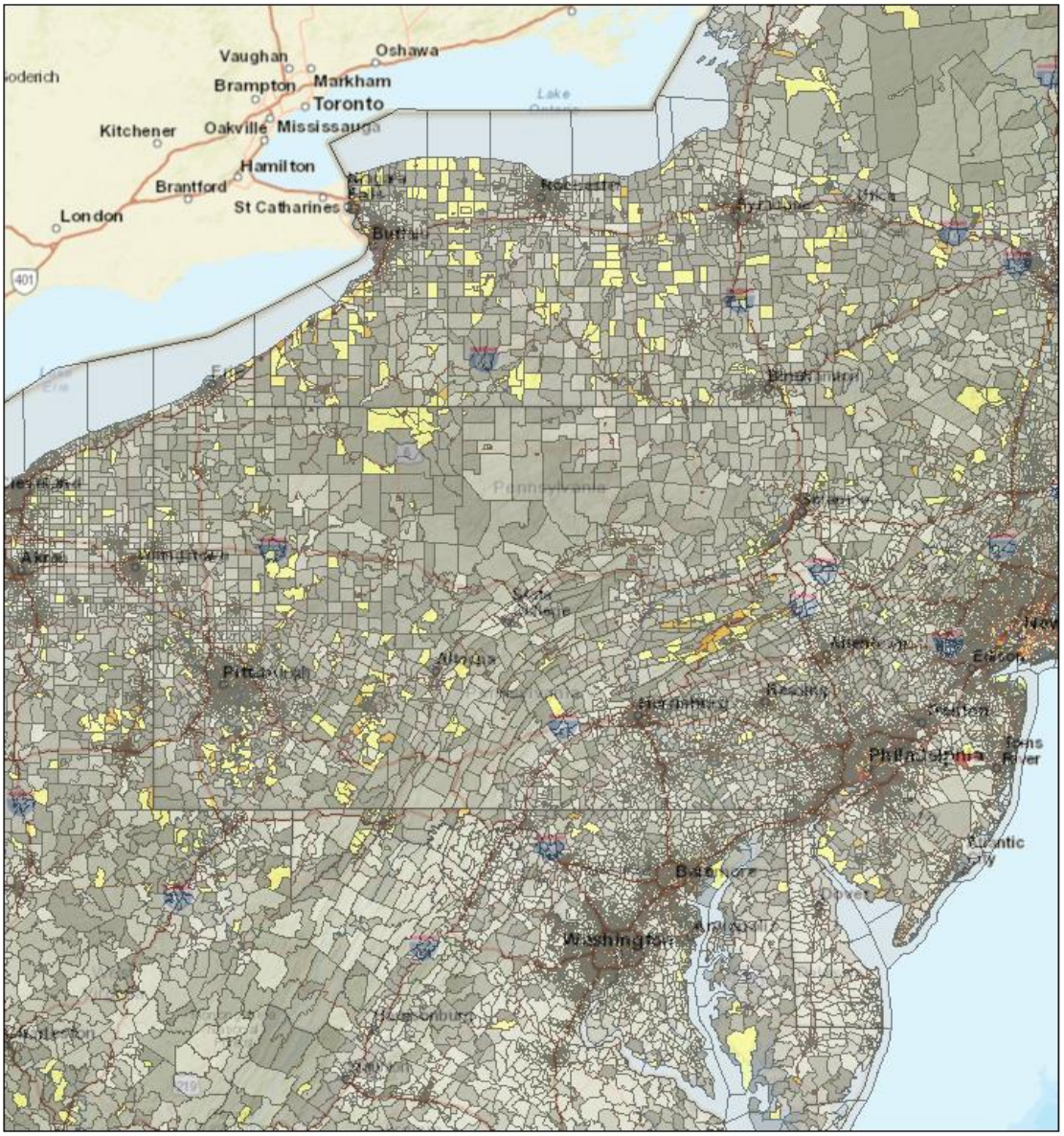
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
EPA OEI, OEJ

EJSCREEN 2016

Pennsylvania Lead Paint Exposure



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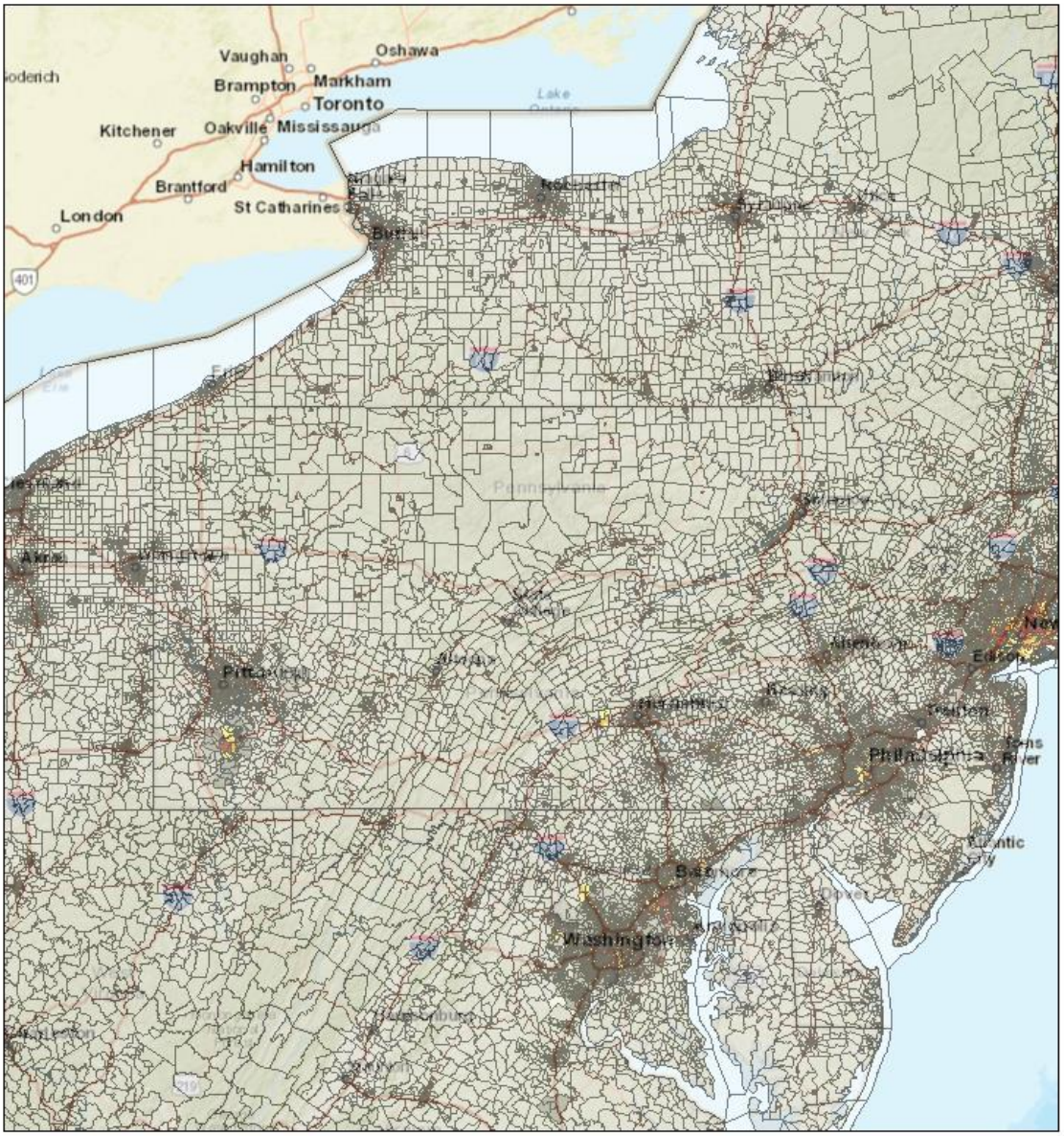
EPA OEI, OEJ

EJSCREEN 2016

Pennsylvania Respiratory Hazard Index



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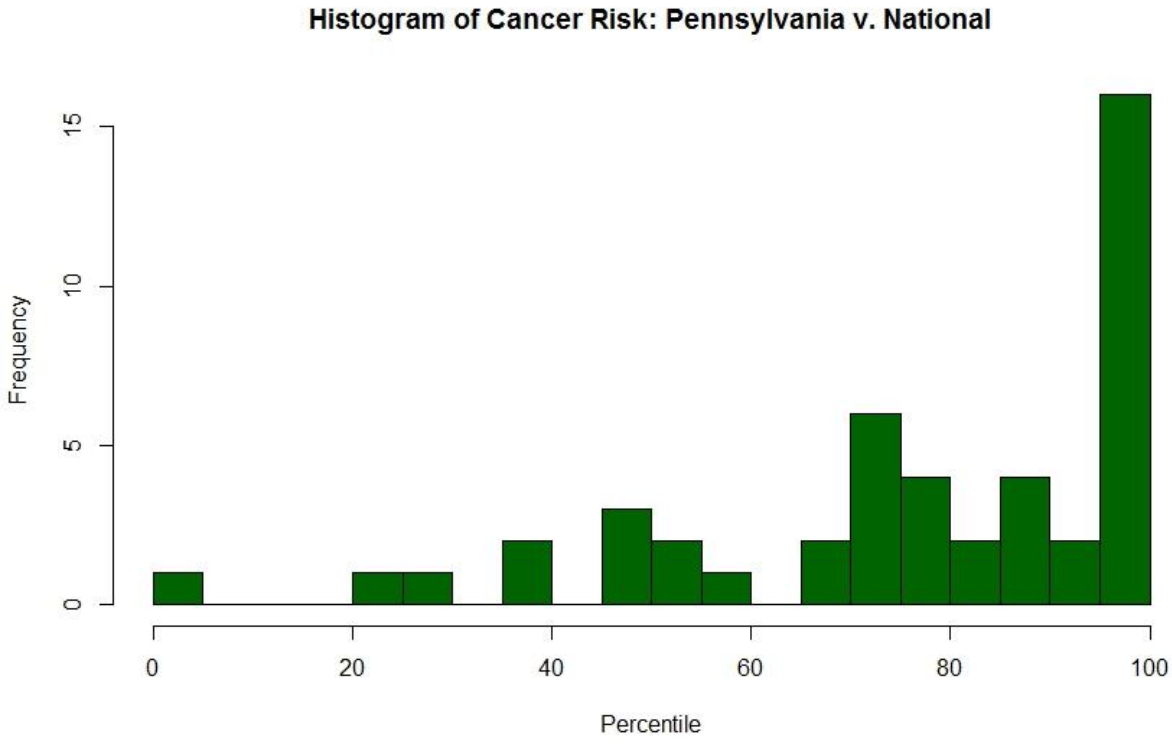
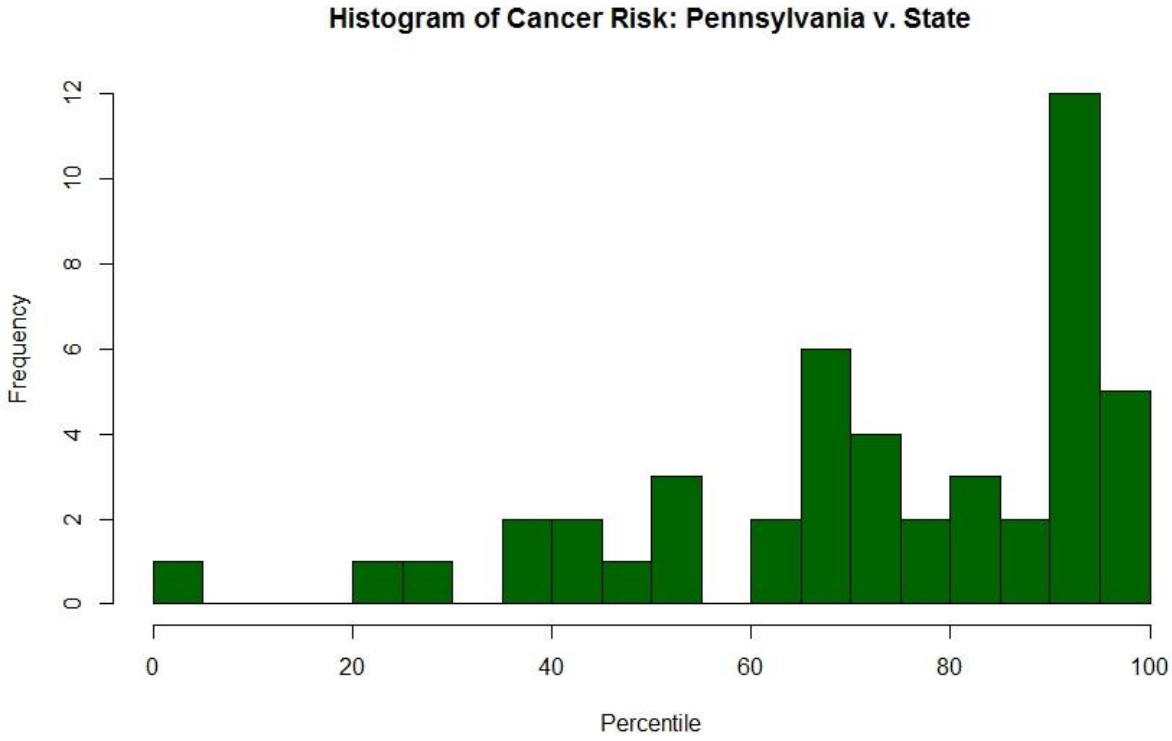
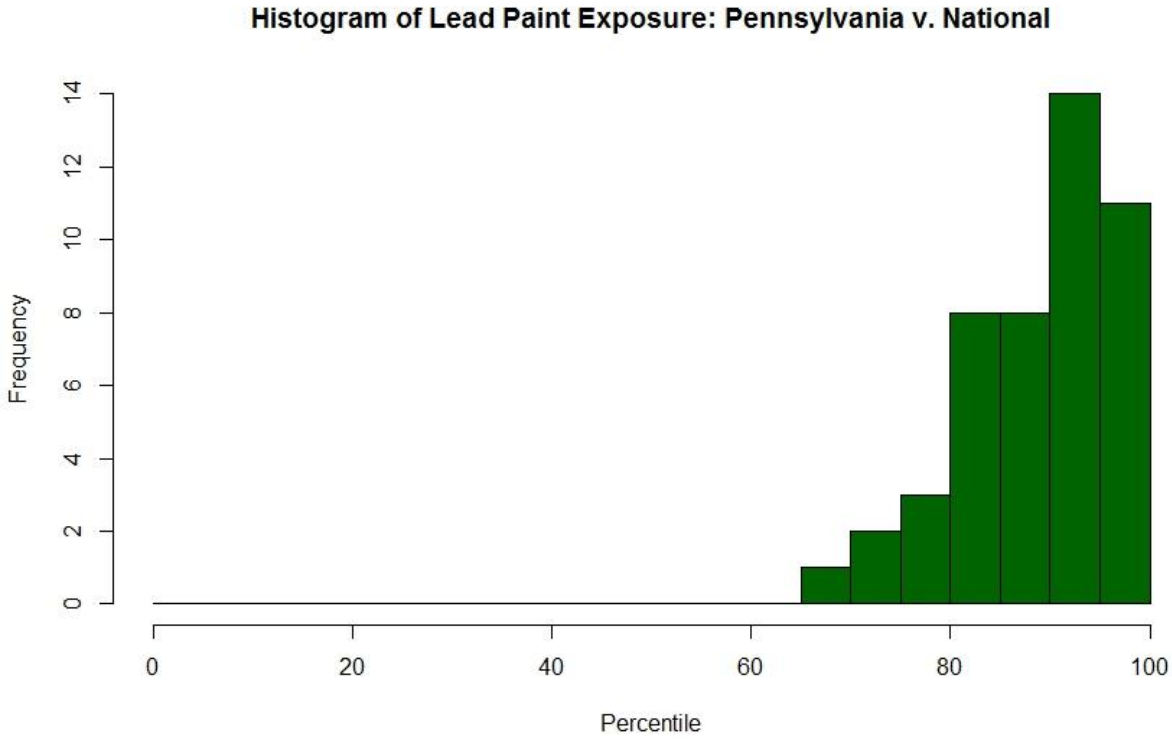
EPA OEI, OEJ

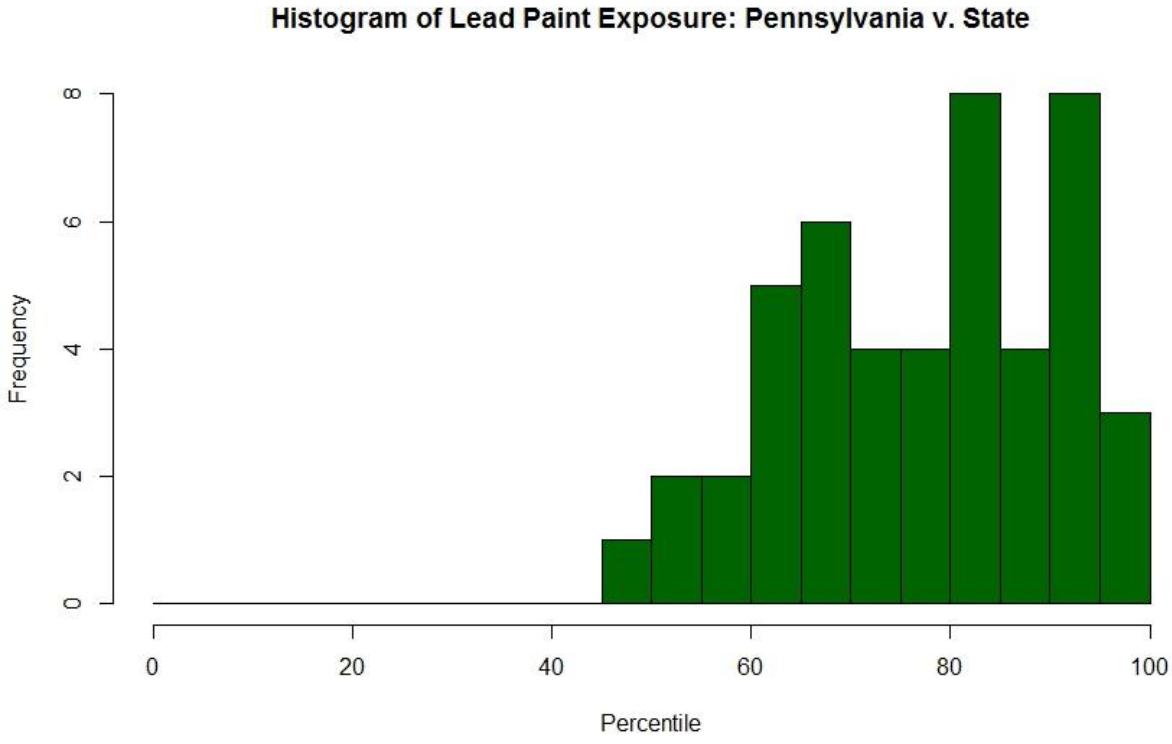
EJSCREEN 2016

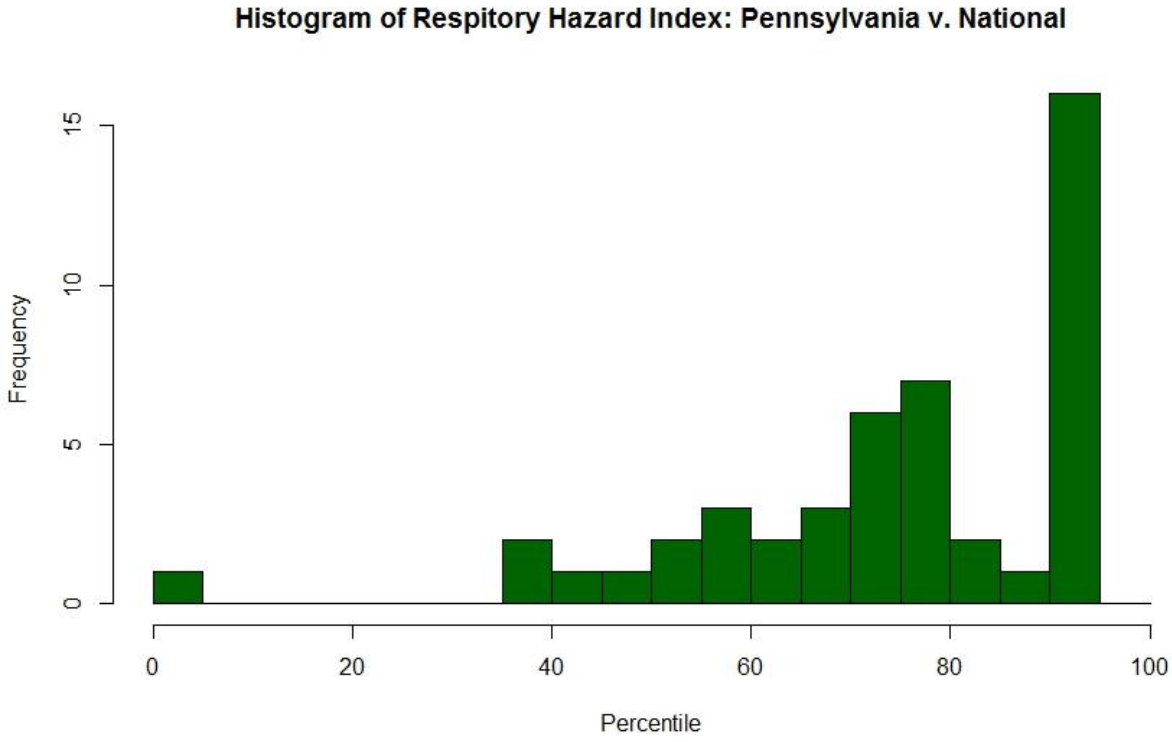
Appendix B: Distribution of Percentile Rankings

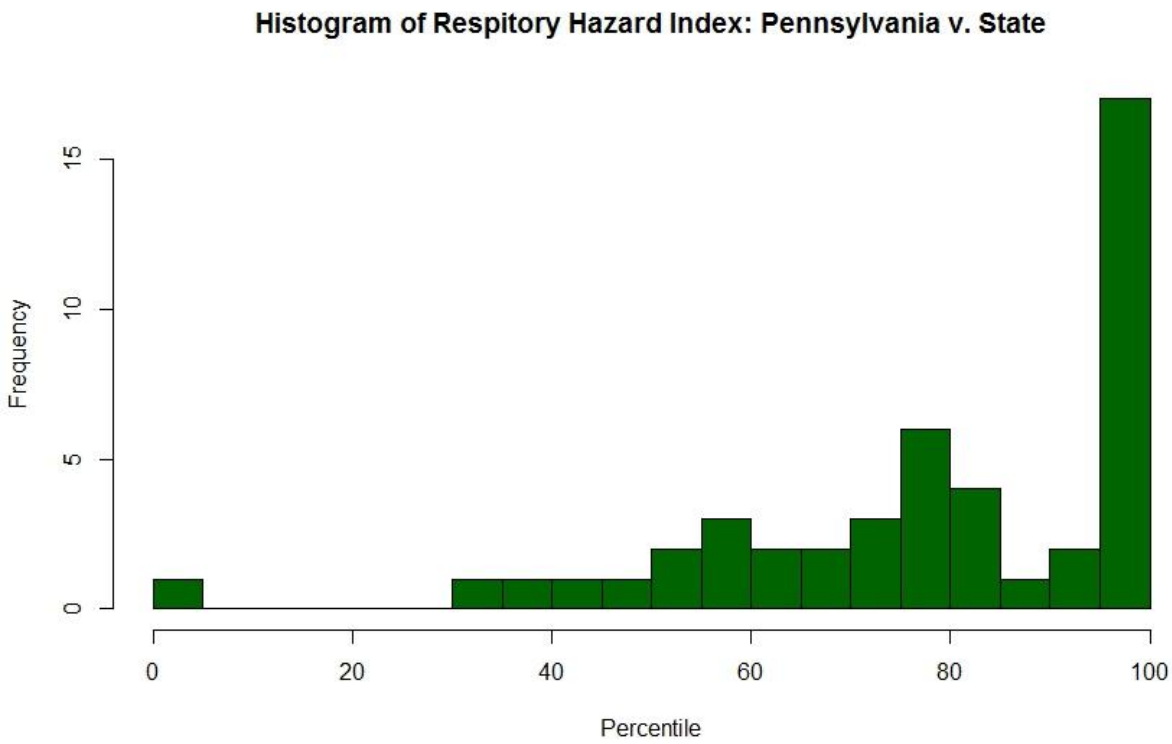


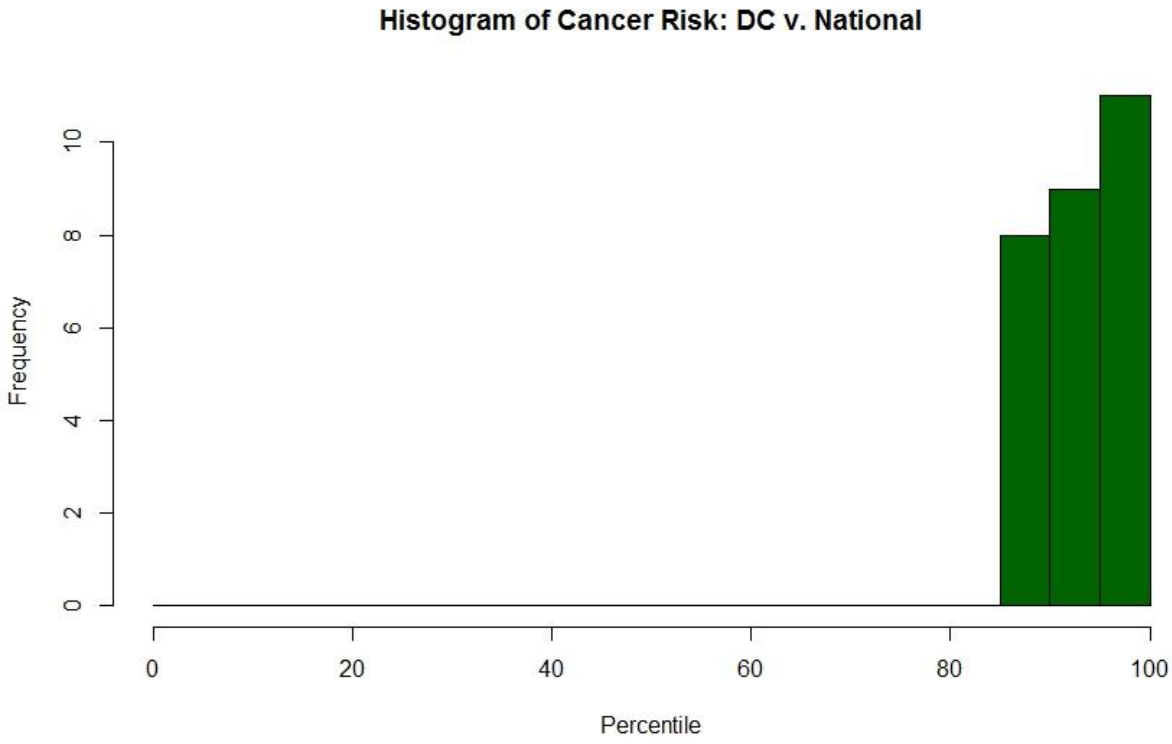


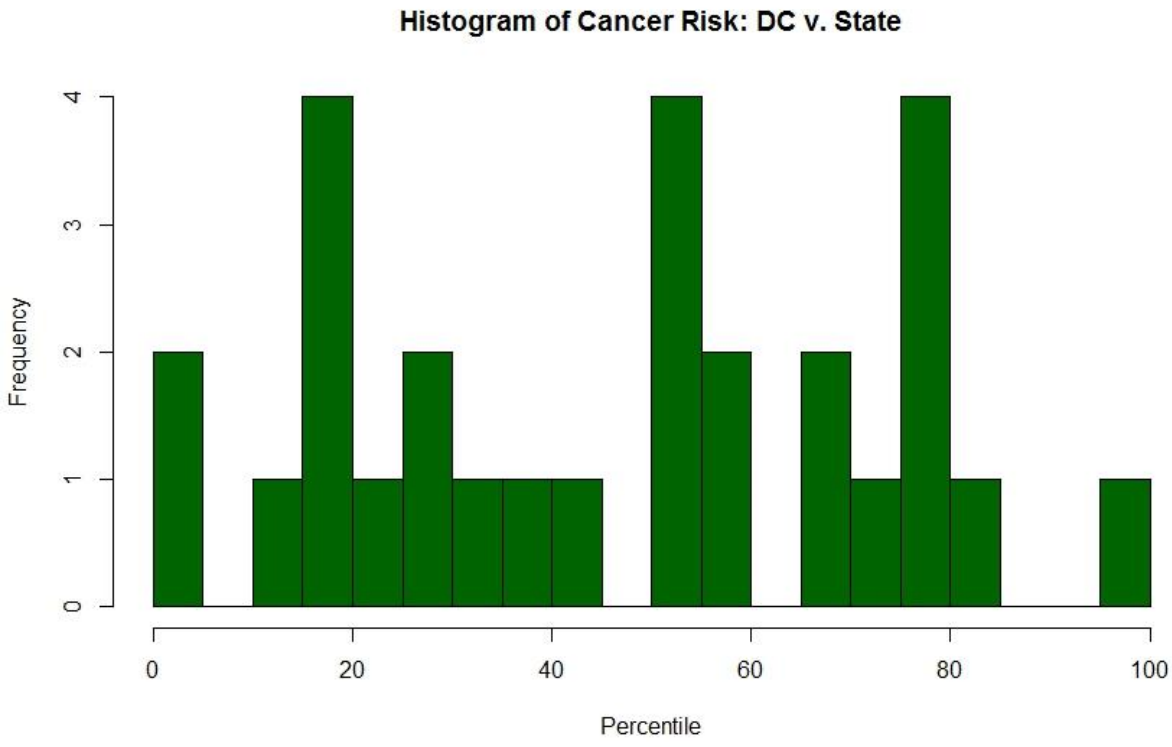

Histogram of Lead Paint Exposure: Pennsylvania v. National
Frequency
0
2
4
6
8
10
12
14
0
20
40
60
80
100
Percentile

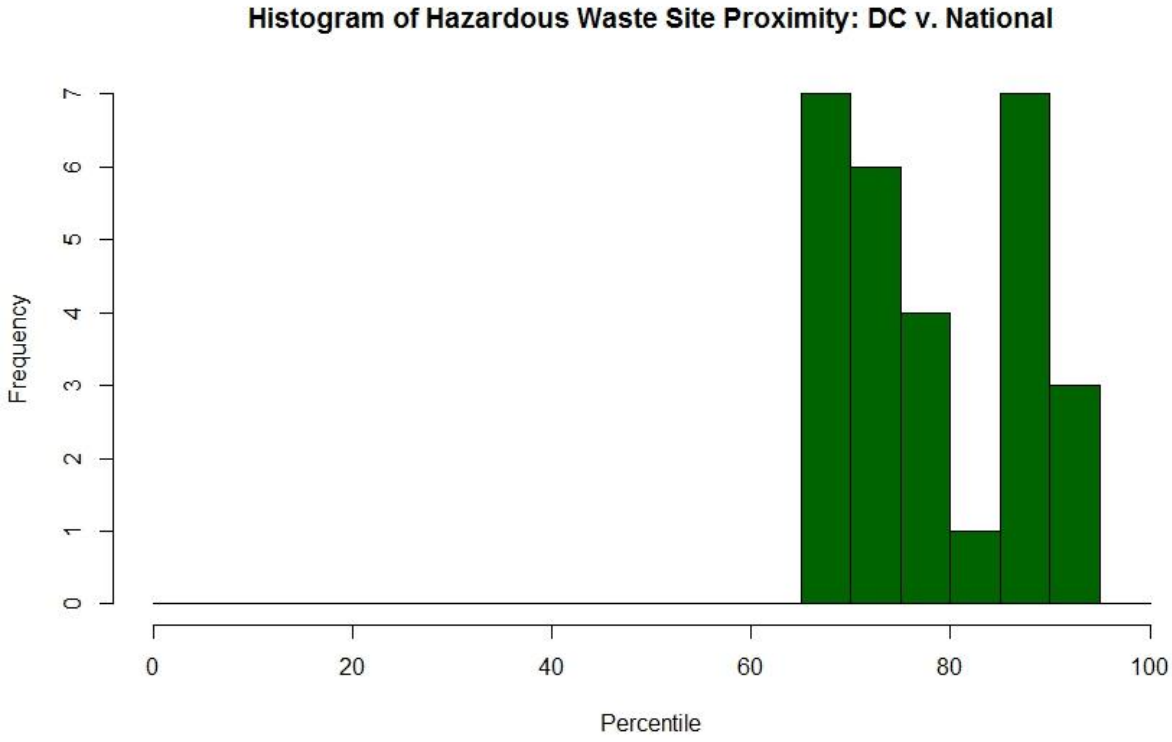

Histogram of Lead Paint Exposure: Pennsylvania v. State
Frequency
0
2
4
6
8
0
20
40
60
80
100
Percentile

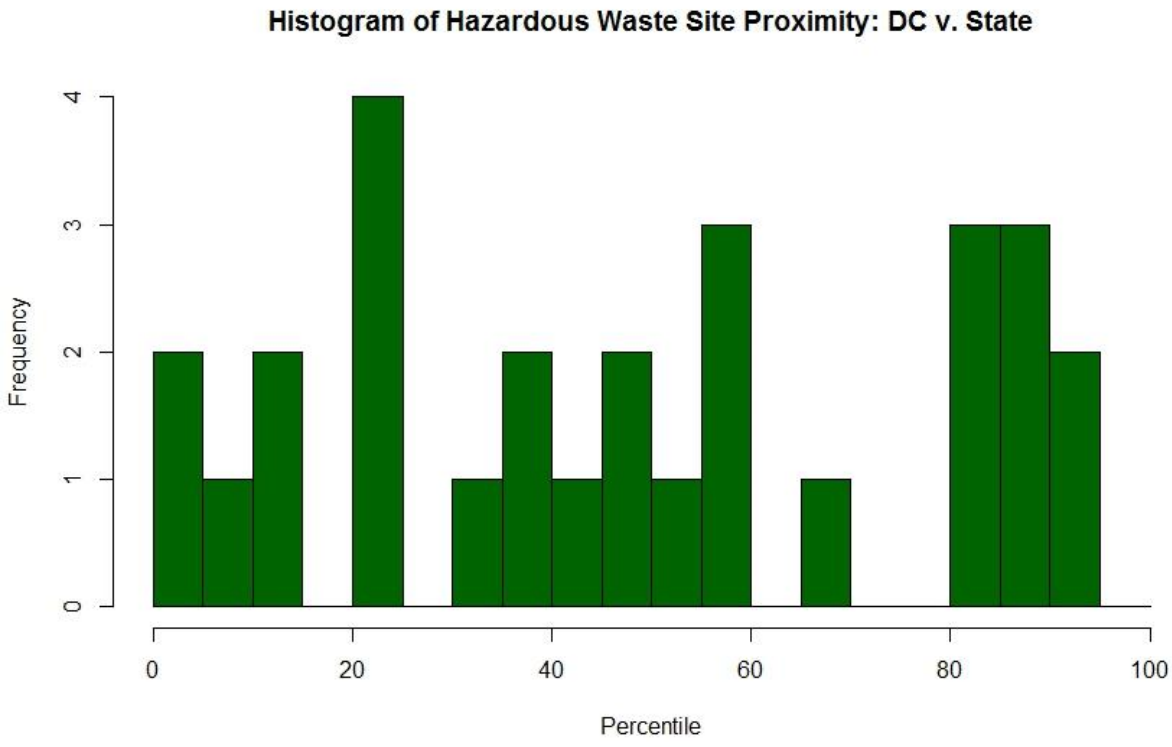

Histogram of Respitory Hazard Index: Pennsylvania v. National
Frequency
0
5
10
15
0
20
40
60
80
100
Percentile

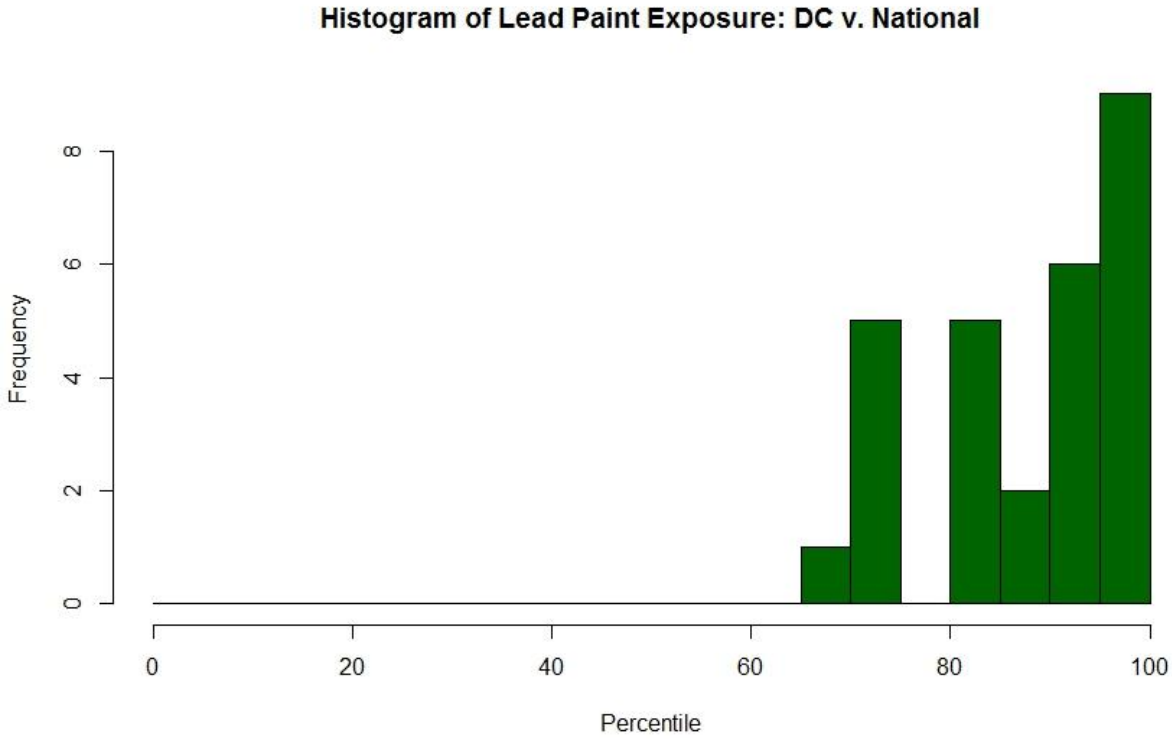

Histogram of Respitory Hazard Index: Pennsylvania v. State
Frequency
0
5
10
15
0
20
40
60
80
100
Percentile

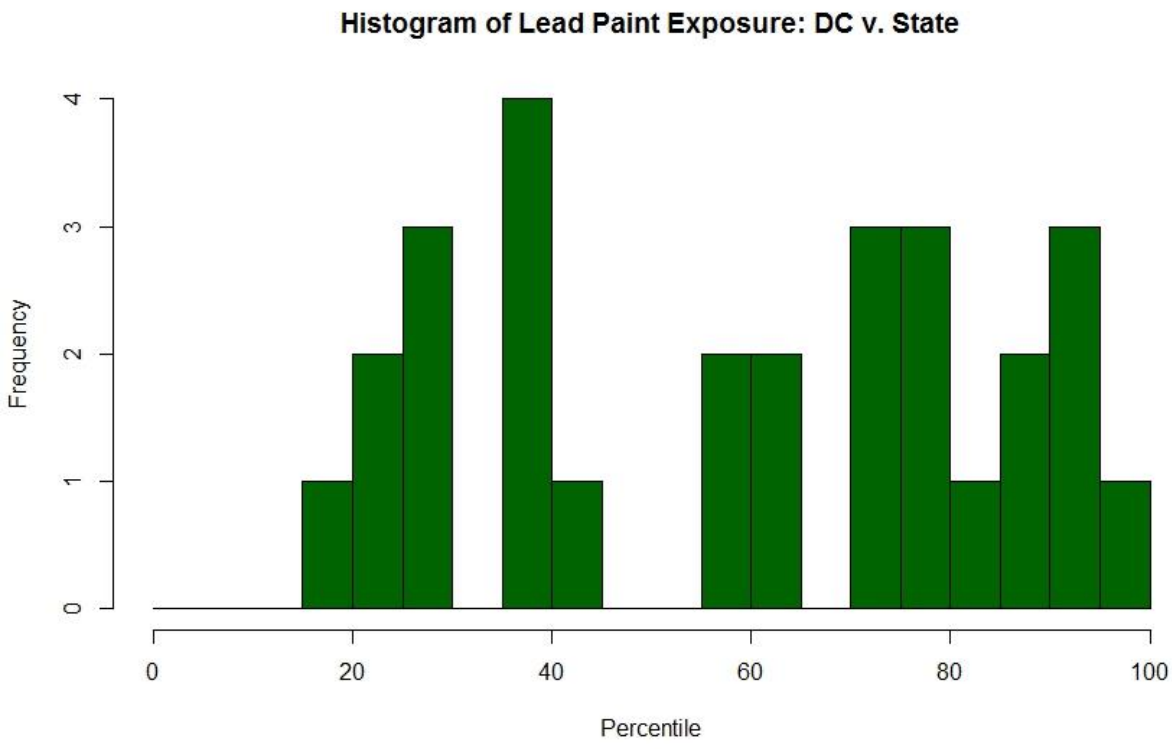

Histogram of Cancer Risk: DC v. National
Frequency
0
2
4
6
8
10
0
20
40
60
80
100
Percentile

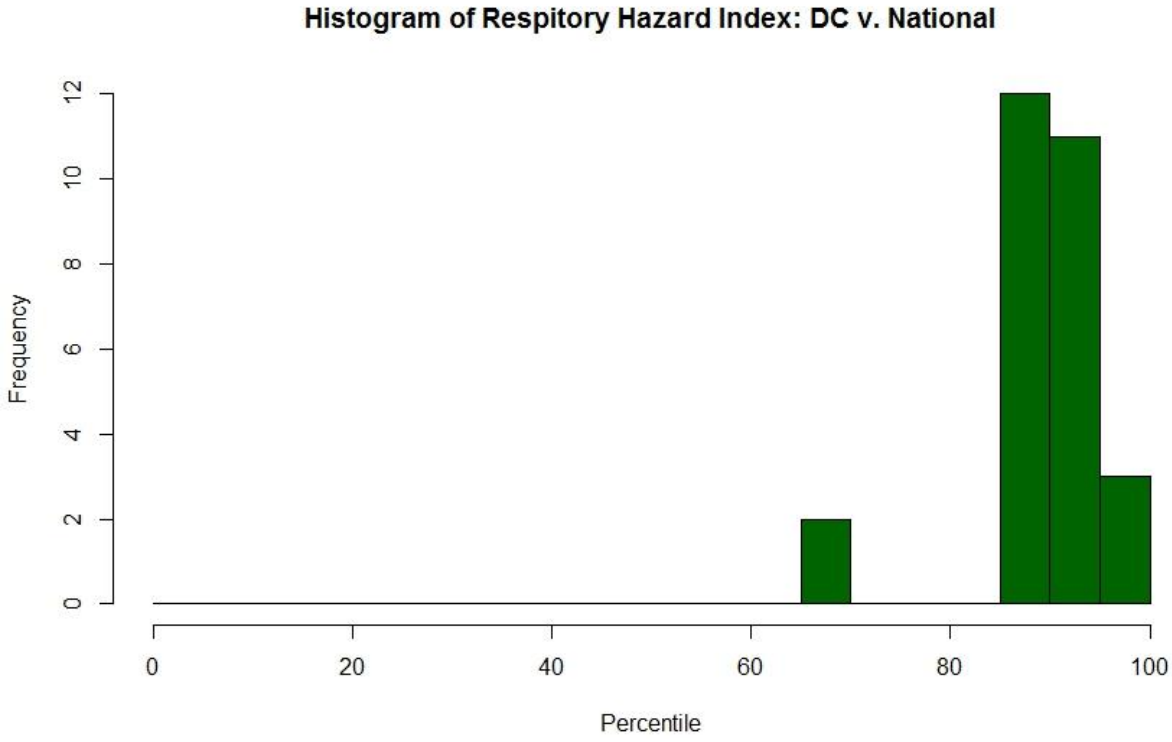

Histogram of Cancer Risk: DC v. State
Frequency
0
1
2
3
4
0
20
40
60
80
100
Percentile

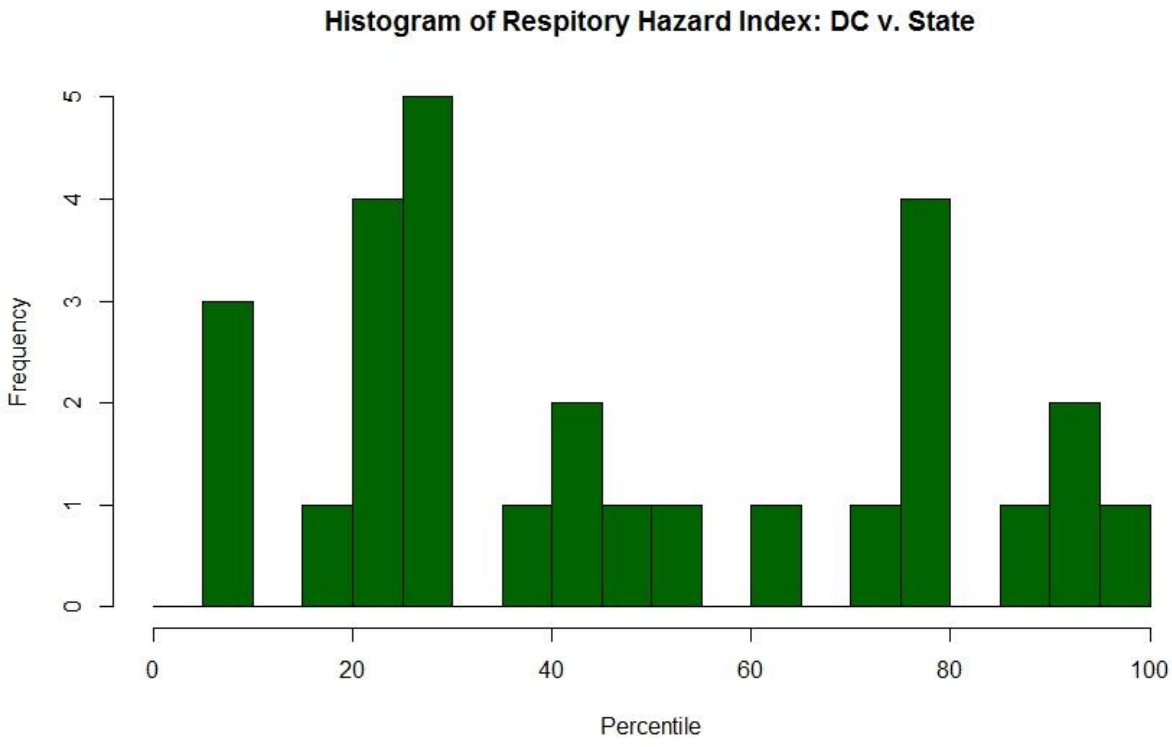

Histogram of Hazardous Waste Site Proximity: DC v. National
Frequency
0
1
2
3
4
5
6
7
0
20
40
60
80
100
Percentile

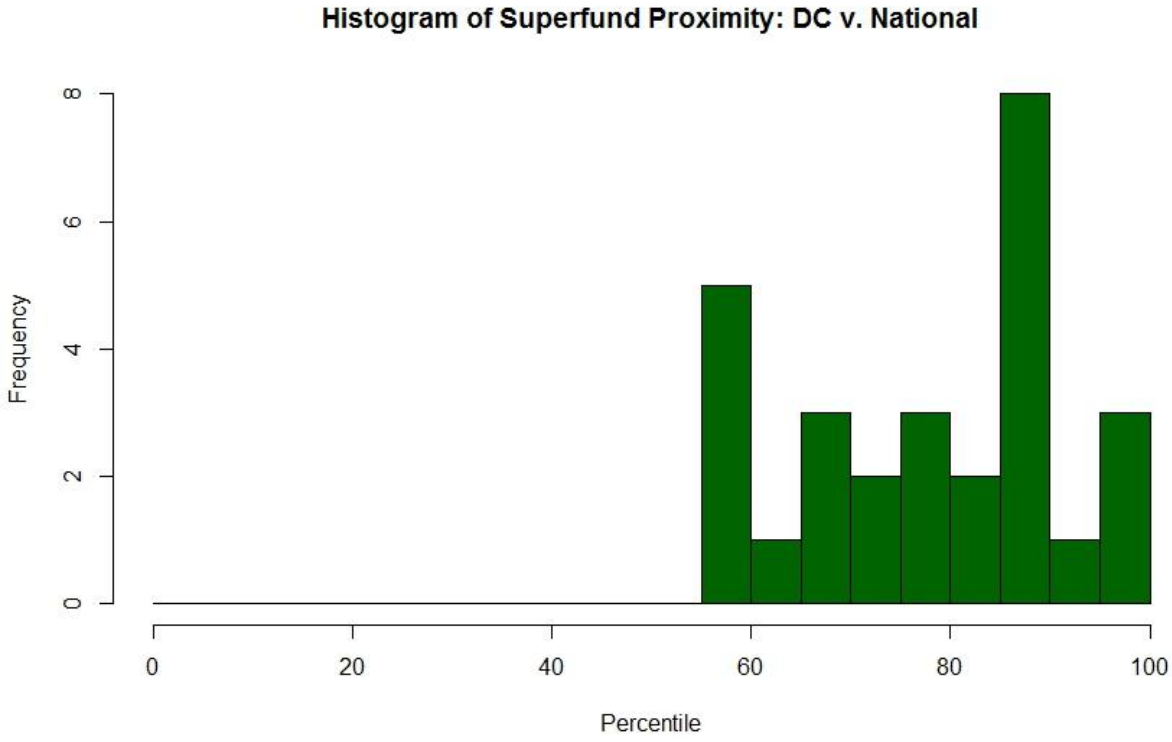

Histogram of Hazardous Waste Site Proximity: DC v. State
Frequency
0
1
2
3
4
0
20
40
60
80
100
Percentile

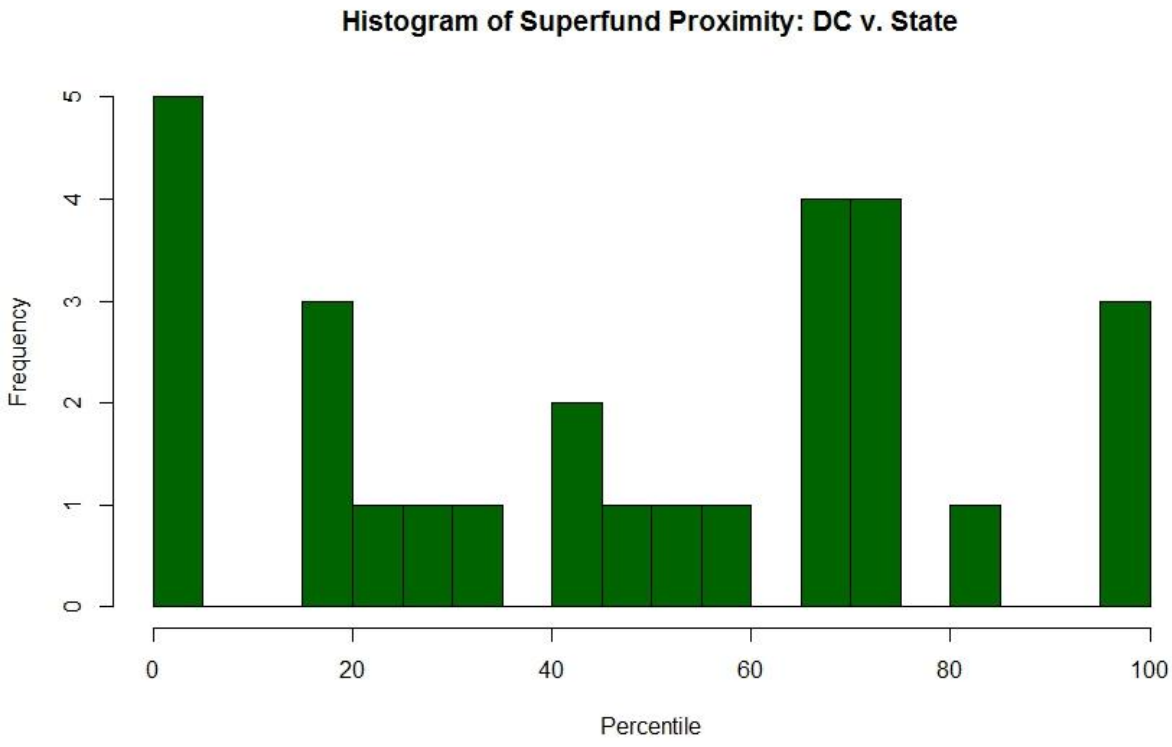

Histogram of Lead Paint Exposure: DC v. National
Frequency
0
2
4
6
8
0
20
40
60
80
100
Percentile

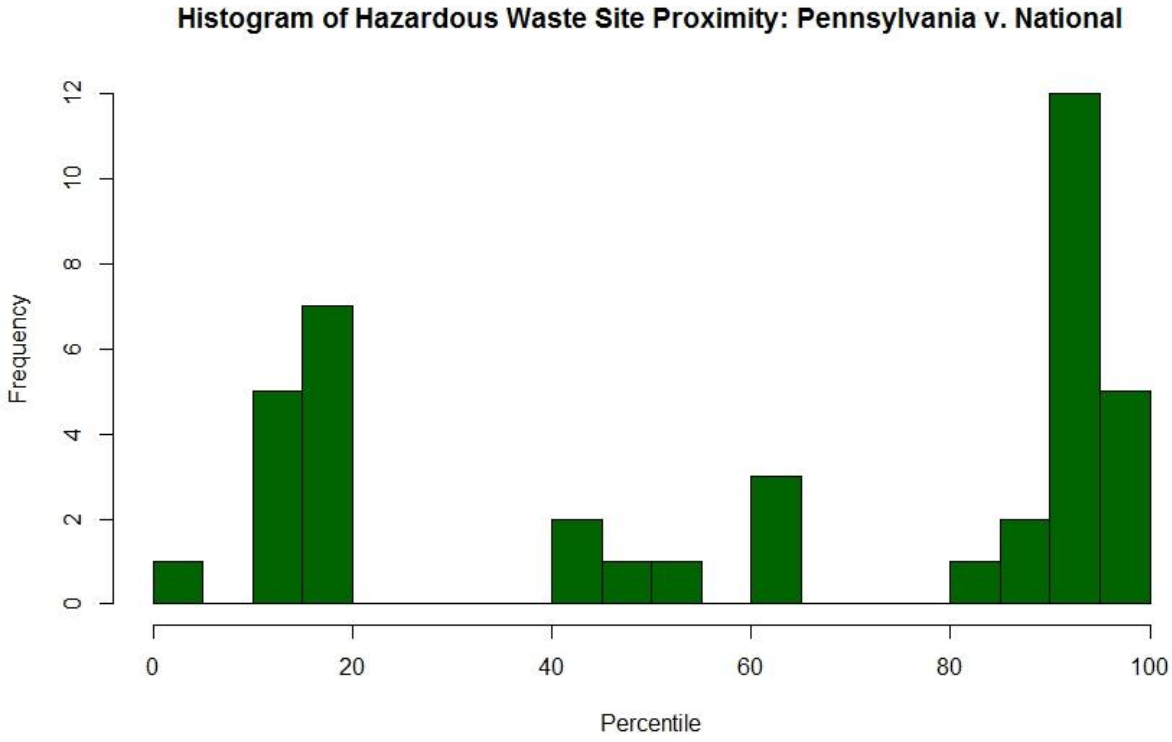

Histogram of Lead Paint Exposure: DC v. State
Frequency
0
1
2
3
4
0
20
40
60
80
100
Percentile

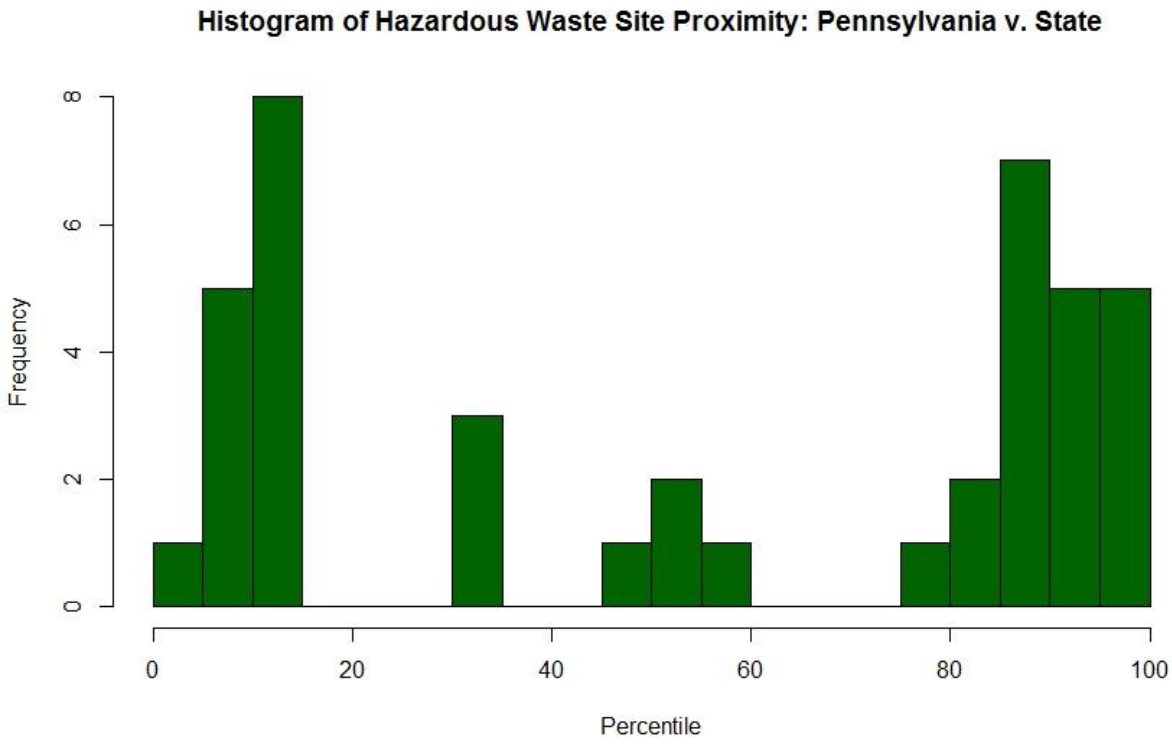

Histogram of Respitory Hazard Index: DC v. National
Frequency
0
2
4
6
8
10
12
0
20
40
60
80
100
Percentile

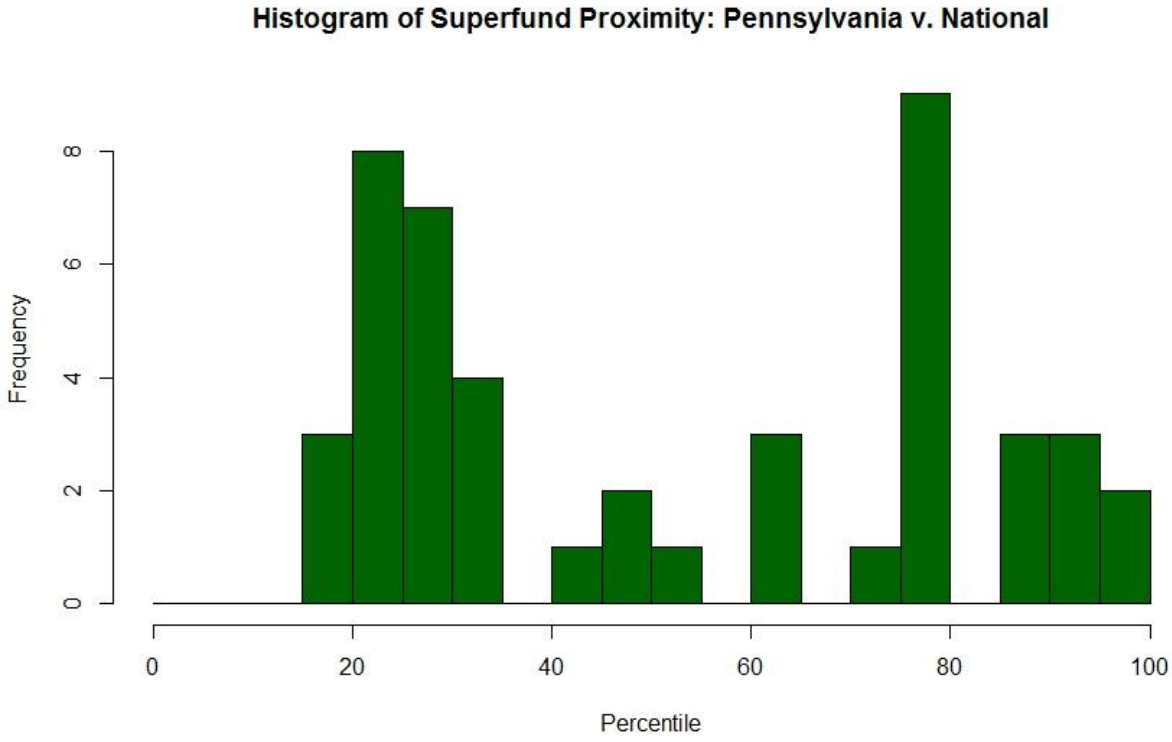

Histogram of Respitory Hazard Index: DC v. State
Frequency
0
1
2
3
4
5
0
20
40
60
80
100
Percentile

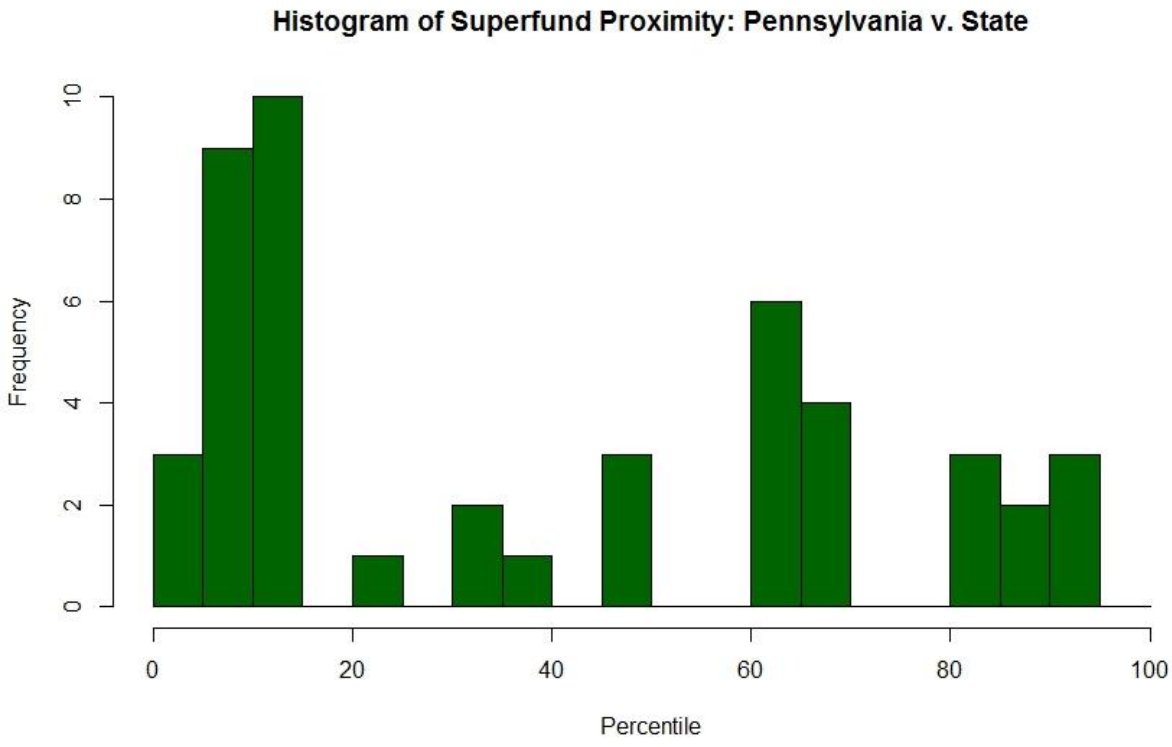

Histogram of Superfund Proximity: DC v. National
Frequency
0
2
4
6
8
0
20
40
60
80
100
Percentile


Histogram of Superfund Proximity: DC v. State
Frequency
0
1
2
3
4
5
0
20
40
60
80
100
Percentile


Histogram of Hazardous Waste Site Proximity: Pennsylvania v. National
Frequency
0
2
4
6
8
10
12
0
20
40
60
80
100
Percentile


Histogram of Hazardous Waste Site Proximity: Pennsylvania v. State
Frequency
0
2
4
6
8
0
20
40
60
80
100
Percentile


Histogram of Superfund Proximity: Pennsylvania v. National
Frequency
0
2
4
6
8
0
20
40
60
80
100
Percentile


Histogram of Superfund Proximity: Pennsylvania v. State
Frequency
0
2
4
6
8
10
0
20
40
60
80
100
Percentile

Appendix C: Boxplots for Pennsylvania