Elevated Child Blood Lead Levels 2005-2016

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1 Introduction

This report explores data from NYC Open Data on the number of children under the age of 6 with elevated blood lead levels (BLL) from 2005-2016 in New York City. This data captures children with BLL of 5 micrograms per deciliter (ug/dl) because this was the reference level at the time of data collection. However, as of May, 2021 science and health experts have lowered the reference level to 3.5 ug/dl.

That being said, lead is highly toxic, and there is no known safe level of lead. Lead is particularly harmful to children's health as it damages the brain and nervous system, slows growth and development and causes learning, behavioral, speech and nervous system issues. This leads to children having lower performance in schools and a lower IQ.

2 Methods and Results

This report is a way for me to learn how to use R, while exploring some data that is interesting to me and relevant to my work and career as an Environmental Health Coordinator at WE ACT for Environmental Justice. Throughout the R in 3 months course, I learned how to turn messy /raw data into beautiful charts and graphs that communicate a message. I learned how to import data in different formats, clean the variable names, "wrangle" the data, or change it to get only the variables and comparisons of interest, "tidy" the data to ensure the variables are named and assigned correctly, and then finally visually display my data in graphs and tables. In the following Results section you will see some of the outputs I created using the skills I learned throughout the course.

3 Results

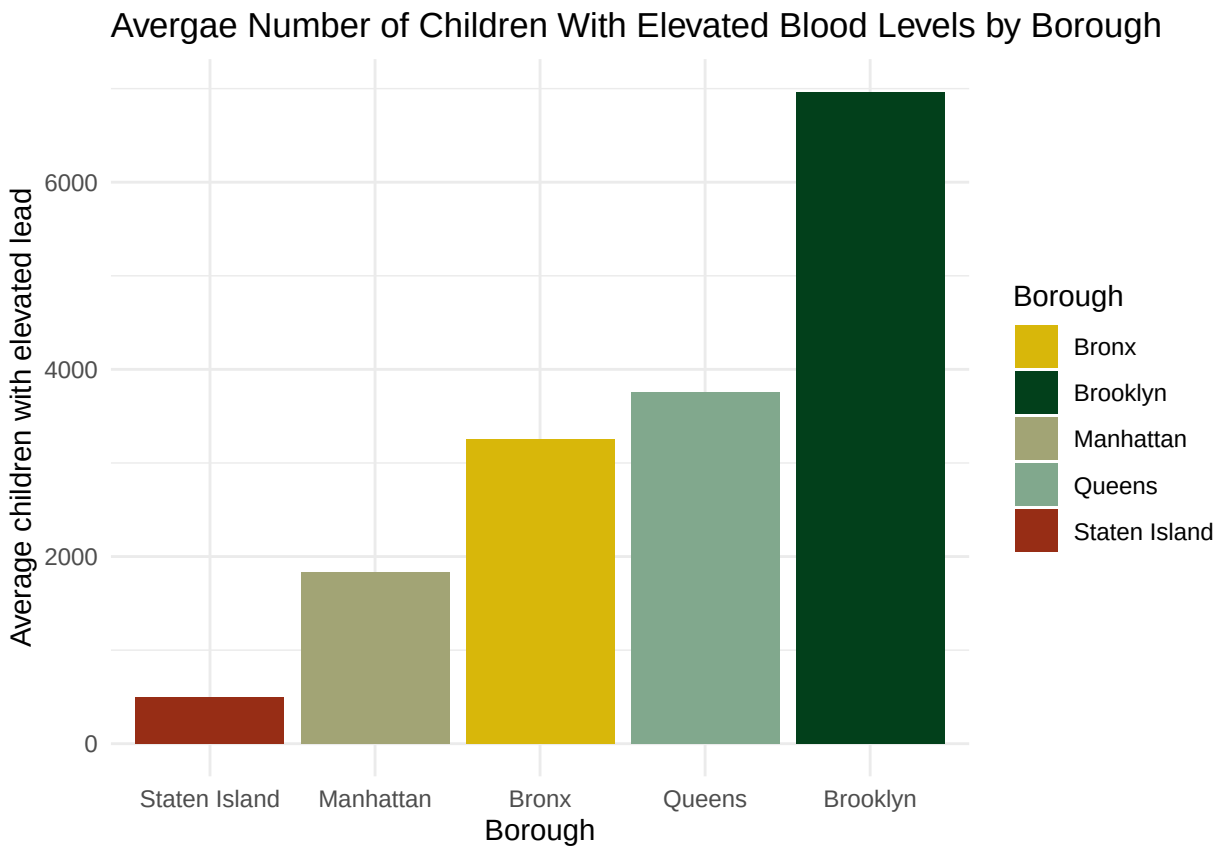
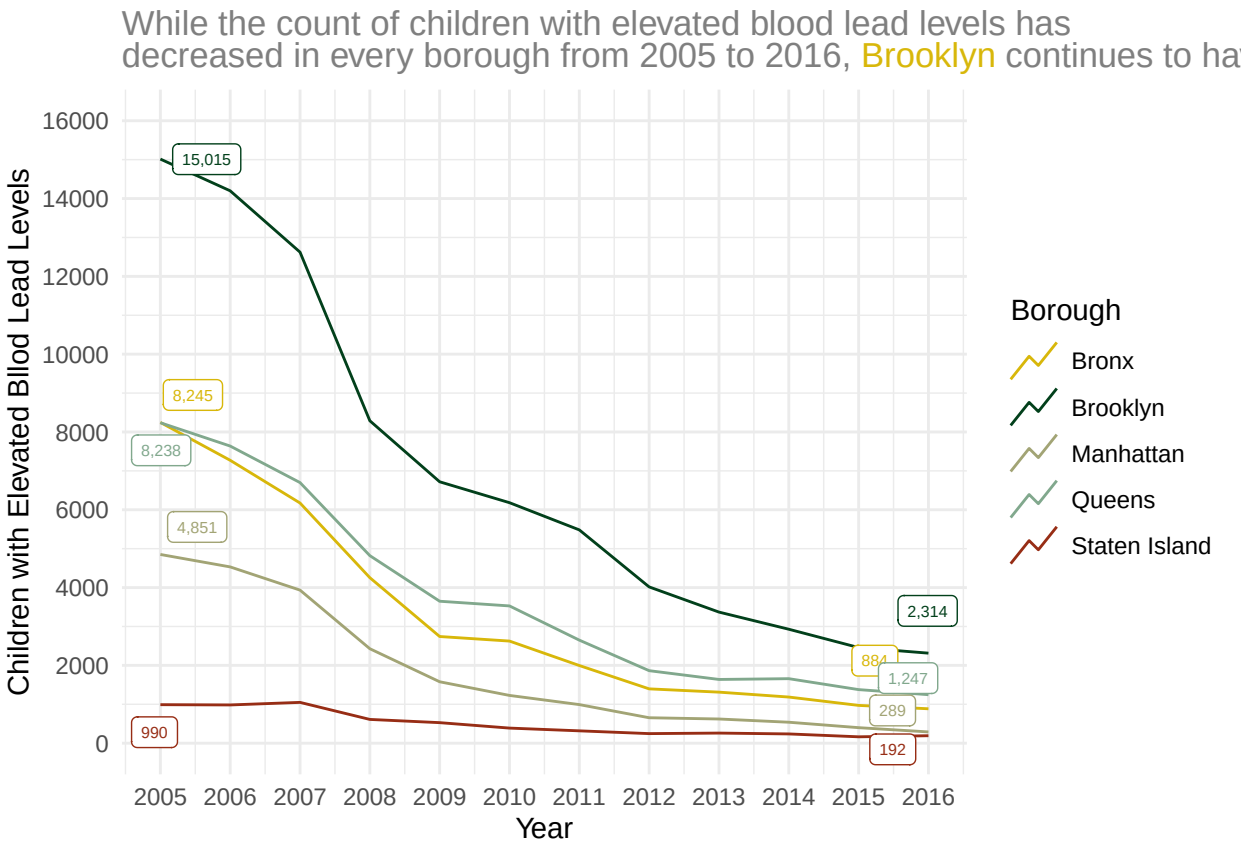


Figure 1: Graphing the average number of children with BLL of 5ug/dl or higher by borough in NYC.

3.1 Graph 2: Graphing the count of children with BLL of 5ug/dl or higher by borough over time.



3.2 Rate of children with BLL of 5ug/dl or higher by borough

name	genus	vore	order	conservation	sleep_total	sleep_rem
Cheetah	Acinonyx	carni	Carnivora	lc	12.1	NA
Owl monkey	Aotus	omni	Primates	NA	17.0	1.8
Mountain beaver	Aplodontia	herbi	Rodentia	nt	14.4	2.4
Greater short-tailed shrew	Blarina	omni	Soricomorpha	lc	14.9	2.3
Cow	Bos	herbi	Artiodactyla	domesticated	4.0	0.7
Three-toed sloth	Bradypus	herbi	Pilosa	NA	14.4	2.2
Northern fur seal	Callorhinus	carni	Carnivora	vu	8.7	1.4
Vesper mouse	Calomys	NA	Rodentia	NA	7.0	NA
Dog	Canis	carni	Carnivora	domesticated	10.1	2.9
Roe deer	Capreolus	herbi	Artiodactyla	lc	3.0	NA
Goat	Capri	herbi	Artiodactyla	lc	5.3	0.6
Guinea pig	Cavis	herbi	Rodentia	domesticated	9.4	0.8
Grivet	Cercopithecus	omni	Primates	lc	10.0	0.7
Chinchilla	Chinchilla	herbi	Rodentia	domesticated	12.5	1.5
Star-nosed mole	Condylura	omni	Soricomorpha	lc	10.3	2.2
African giant pouched rat	Cricetomys	omni	Rodentia	NA	8.3	2.0
Lesser short-tailed shrew	Cryptotis	omni	Soricomorpha	lc	9.1	1.4
Long-nosed armadillo	Dasypus	carni	Cingulata	lc	17.4	3.1
Tree hyrax	Dendrohyrax	herbi	Hyracoidea	lc	5.3	0.5

North American Opossum	Didelphis	omni	Didelphimorphia	lc	18.0	4.9
Asian elephant	Elephas	herbi	Proboscidea	en	3.9	NA
Big brown bat	Eptesicus	insecti	Chiroptera	lc	19.7	3.9
Horse	Equus	herbi	Perissodactyla	domesticated	2.9	0.6
Donkey	Equus	herbi	Perissodactyla	domesticated	3.1	0.4
European hedgehog	Erinaceus	omni	Erinaceomorpha	lc	10.1	3.5
Patas monkey	Erythrocebus	omni	Primates	lc	10.9	1.1
Western american chipmunk	Eutamias	herbi	Rodentia	NA	14.9	NA
Domestic cat	Felis	carni	Carnivora	domesticated	12.5	3.2
Galago	Galago	omni	Primates	NA	9.8	1.1
Giraffe	Giraffa	herbi	Artiodactyla	cd	1.9	0.4
Pilot whale	Globicephalus	carni	Cetacea	cd	2.7	0.1
Gray seal	Haliochoerus	carni	Carnivora	lc	6.2	1.5
Gray hyrax	Heterohyrax	herbi	Hyracoidea	lc	6.3	0.6
Human	Homo	omni	Primates	NA	8.0	1.9
Mongoose lemur	Lemur	herbi	Primates	vu	9.5	0.9
African elephant	Loxodonta	herbi	Proboscidea	vu	3.3	NA
Thick-tailed opposum	Lutreolina	carni	Didelphimorphia	lc	19.4	6.6
Macaque	Macaca	omni	Primates	NA	10.1	1.2
Mongolian gerbil	Meriones	herbi	Rodentia	lc	14.2	1.9
Golden hamster	Mesocricetus	herbi	Rodentia	en	14.3	3.1
Vole	Microtus	herbi	Rodentia	NA	12.8	NA
House mouse	Mus	herbi	Rodentia	nt	12.5	1.4
Little brown bat	Myotis	insecti	Chiroptera	NA	19.9	2.0
Round-tailed muskrat	Neofiber	herbi	Rodentia	nt	14.6	NA
Slow loris	Nyctibeus	carni	Primates	NA	11.0	NA
Degu	Octodon	herbi	Rodentia	lc	7.7	0.9
Northern grasshopper mouse	Onychomys	carni	Rodentia	lc	14.5	NA
Rabbit	Oryctolagus	herbi	Lagomorpha	domesticated	8.4	0.9
Sheep	Ovis	herbi	Artiodactyla	domesticated	3.8	0.6
Chimpanzee	Pan	omni	Primates	NA	9.7	1.4
Tiger	Panthera	carni	Carnivora	en	15.8	NA
Jaguar	Panthera	carni	Carnivora	nt	10.4	NA
Lion	Panthera	carni	Carnivora	vu	13.5	NA
Baboon	Papio	omni	Primates	NA	9.4	1.0
Desert hedgehog	Paraechinus	NA	Erinaceomorpha	lc	10.3	2.7
Potto	Perodicticus	omni	Primates	lc	11.0	NA
Deer mouse	Peromyscus	NA	Rodentia	NA	11.5	NA
Phalanger	Phalanger	NA	Diprotodontia	NA	13.7	1.8
Caspian seal	Phoca	carni	Carnivora	vu	3.5	0.4
Common porpoise	Phocoena	carni	Cetacea	vu	5.6	NA
Potoroo	Potorous	herbi	Diprotodontia	NA	11.1	1.5
Giant armadillo	Priodontes	insecti	Cingulata	en	18.1	6.1
Rock hyrax	Procavia	NA	Hyracoidea	lc	5.4	0.5
Laboratory rat	Rattus	herbi	Rodentia	lc	13.0	2.4
African striped mouse	Rhabdomys	omni	Rodentia	NA	8.7	NA
Squirrel monkey	Saimiri	omni	Primates	NA	9.6	1.4
Eastern american mole	Scalopus	insecti	Soricomorpha	lc	8.4	2.1
Cotton rat	Sigmodon	herbi	Rodentia	NA	11.3	1.1
Mole rat	Spalax	NA	Rodentia	NA	10.6	2.4
Arctic ground squirrel	Spermophilus	herbi	Rodentia	lc	16.6	NA
Thirteen-lined ground squirrel	Spermophilus	herbi	Rodentia	lc	13.8	3.4
Golden-mantled ground squirrel	Spermophilus	herbi	Rodentia	lc	15.9	3.0
Musk shrew	Suncus	NA	Soricomorpha	NA	12.8	2.0

Pig	Sus	omni	Artiodactyla	domesticated	9.1	2.4
Short-nosed echidna	Tachyglossus	insecti	Monotremata	NA	8.6	NA
Eastern american chipmunk	Tamias	herbi	Rodentia	NA	15.8	NA
Brazilian tapir	Tapirus	herbi	Perissodactyla	vu	4.4	1.0
Tenrec	Tenrec	omni	Afrosoricida	NA	15.6	2.3
Tree shrew	Tupaia	omni	Scandentia	NA	8.9	2.6
Bottle-nosed dolphin	Tursiops	carni	Cetacea	NA	5.2	NA
Genet	Genetta	carni	Carnivora	NA	6.3	1.3
Arctic fox	Vulpes	carni	Carnivora	NA	12.5	NA
Red fox	Vulpes	carni	Carnivora	NA	9.8	2.4

4 Conclusion

In order to gain a better understanding of this data. I decided to look at several different types of descriptive statistics across time and geographic region. The raw data has the count of children with elevated blood lead levels divided into several reference dose categories (greater than or equal to 5 ug/dl, 10 ug/dl, and 15 ug/dl). I chose to analyze the greater than or equal to 5 ug/dl variable, and that is how I define elevated BLL throughout the report. First, I explored the average number of children with elevated BLL overall by borough, and found Brooklyn to have the highest number.

In order to see if this trend was consistent over time, I explored the count of children with elevated BLL in each borough every year from 2005-2016. The results indicate that over time, even though cases in every borough have decreased, Brooklyn still has a lot more than the other boroughs. Finally, I was interested in the rate, which is calculated as the number of children who tested positive for elevated BLL out of all the children tested. I was curious to see if another borough had a faster rate of elevated BLL in children. The results suggest that Brooklyn also has the fastest rate.

5 Limaitations and Future Steps

One limitation to this report is that the dataset I used is small and outdated. Thus,it would be good to revise analysis once NY state releases updated data. Alternatively, I could find some other supplemental data from the CDC, or another reporting agency.

For future steps, I would like to explore the data on a smaller scale, looking at chidrens' elevated BLL by neighborhood. That way, I could see if there are any specific hotspots in Brooklyn and maybe even put the data on a map with other layers to spatially analyze trends. Because my job focuses on northern manhattan, I am also interested in seeing how the northern manhattan neighborhoods compare to other neighborhoods in the state. Finally, I can look at the other BLL reference limits to get even finer details of analysis.