

Conclusions

- Our findings demonstrate that older housing and higher greenspace density are positively correlated with higher lead and arsenic soil contamination.
- In three out of four San Francisco residential neighborhoods tested for lead, the mean contamination level exceeded EPA standards
- Higher-income neighborhoods, in this case, had more Pb and As as a result of their high greenspace and older housing

Introduction

- Old housing provides more opportunities for exposure to Pb and As. Leaded paint was banned in 1978. Copper-chromated arsenic was used as a preservative for wood in building construction until 2002 (1)
- California's threshold for safe residential soil is 80 ppm Pb, not to be exceeded (2)
- No amount of lead in blood is safe (3)
- Previous studies found that the mean greenspace density across the city was 14% (4). The low-income neighborhoods chosen for this study together have an average of 6%, while the high-income neighborhoods together have an average of 15%

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Research Methods

Location determination: Two low-income communities, Bayview-Hunter's Point and Chinatown, and two high-income communities, the Presidio and Potrero Hill, were selected based on median household income.

Sample collection: 4 oz topsoil samples were collected with an emphasis on high-contact areas to more accurately reflect exposure. The coordinate points of the sample location were also recorded.

Sample processing: Samples were manually dried and sifted to a smaller particle size, then tested with an XRF analyzer.



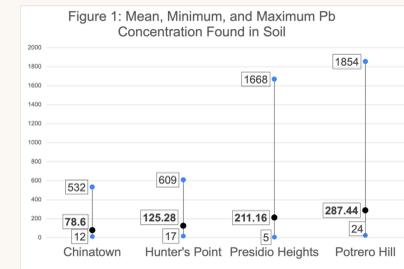
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Results

Potrero Hill soil was found to be the most contaminated with lead and arsenic.

- Average contaminants per soil sample across the four neighborhoods are 172.9 ppm Pb and 8.9 ppm As
- The average Pb level across 3 out of 4 neighborhoods is more than double the state-recommended maximum
- Potrero Hill has the largest mean sample Pb levels at 287.4 ppm, with Presidio Heights having the second largest at 211.1 ppm. They also have the highest concentrations of As, at 10.9 ppm and 9.4 ppm, respectively.



- The neighborhoods with the lowest amounts of Pb, with average concentrations of 123.3 ppm and 76.3 ppm, are Bayview-Hunter's Point and Chinatown, respectively.

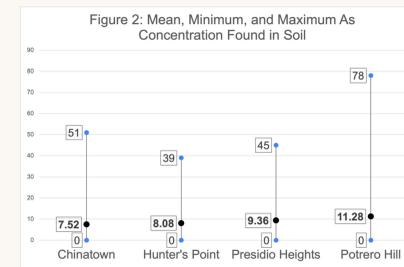
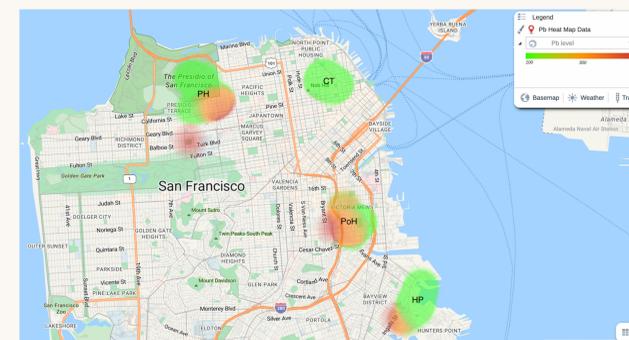


Figure 3: heat map depicting the average soil lead contamination (ppm) found across the four neighborhoods



Discussion

Our numbers suggest that older housing containing heavy metals, coupled with ample soil to contain them, raises contamination rates.

Older housing provides more opportunities for soil contamination through the use of leaded paint and copper-chromated arsenic. Past studies have demonstrated the link between high urban greenspace and heavy metal contamination (5,6).

This is a new finding, as often heavy metal exposure is linked to industrialized areas.

	SF	Chinatown	Hunter's Point	Presidio	Potrero Hill
Mean Year House Built	1952	1951	1965	1945	1987
Median Year House Built	1940 to 1949	1939 or earlier	1960 to 1969	1939 or earlier	1980 to 1989
Percentage Greenspace	14%	5%	6.7%	32.8%	8.7%
Average Income	\$80,383	\$24,656	\$52,431	\$161,615	\$147,671
Average Pb		79 ppm	125 ppm	211 ppm	287 ppm
Average As		8 ppm	8 ppm	9 ppm	11 ppm

Figure 4: table comparing the mean and median years houses are built, percentage greenspace, and average income alongside Pb and As levels across the four neighborhoods.

It should be noted that lack of interaction with nature is linked to depression, higher mental distress, obesity, as well higher mortality rates (7). Low-income neighborhoods are more likely to have low access to greenspace (8).