Public Health
Seattle & King County

Hazardous Waste Management Program

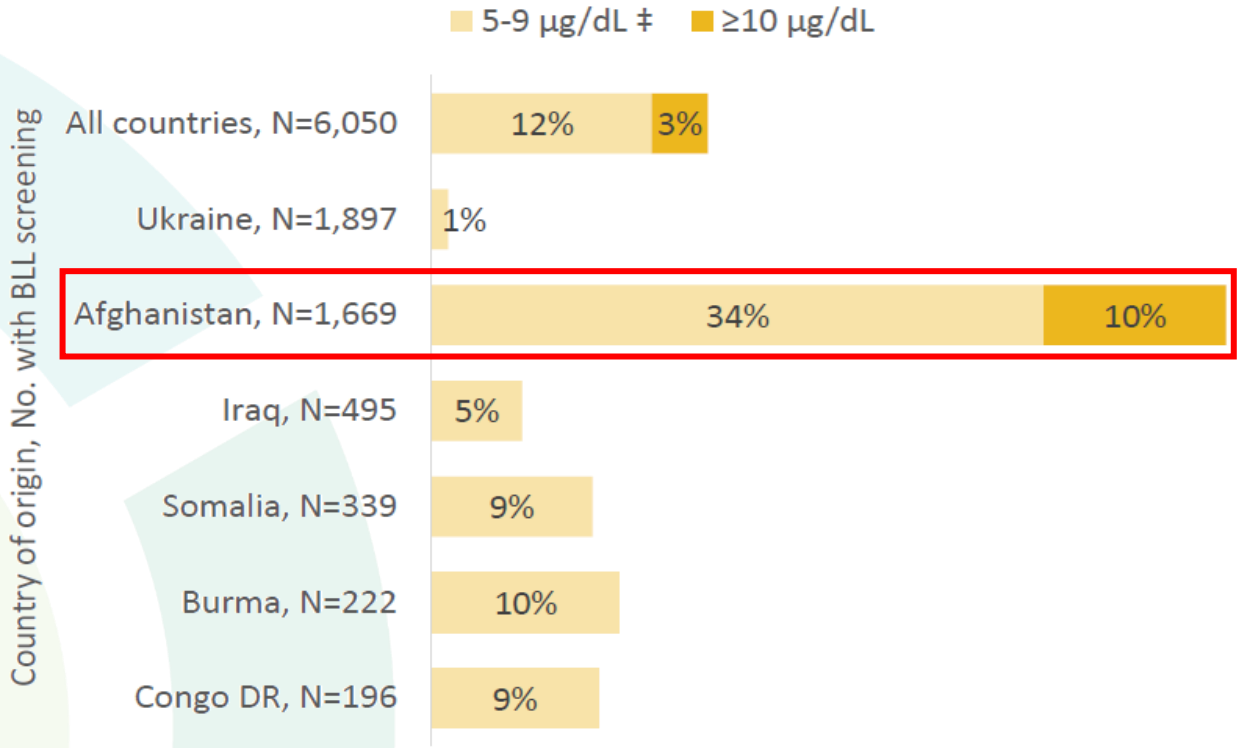
Metal Cookware as a Source of Lead Exposure

Katie M Fellows, MS, PhD
Public Health – Seattle & King County
Hazardous Waste Management Program

National Lead and Healthy Housing Conference – 2025

Blood Lead Level Testing

% Children with Blood Lead Levels above the BLRV, FFY 2016 to 2020, WA State



‡ For All countries combined and for Afghanistan the rate represents children testing in the 5-9 µg/dL range. For other countries, the number of children testing in the ≥10 µg/dL range was either 0 or did not meet small numbers standards, so the rate reflects children testing in the ≥5 µg/dL range.

In-Home Investigations

- Public Health Partnership
- XRF analysis

Lead in Aluminum Cookware

Aluminum cookware in low- and middle-income countries is typically made from discarded scrap metal

- Drinking cans
- Car and motorbike engine parts
- Vehicle radiators and transmissions
- Airplane fuselages
- Lead batteries
- Computer and electronic components

Rashko Baba: Manufacturing Afghan pressure cookers (Radio Free Europe/Azadi Radio): https://youtu.be/ManknFL2BIw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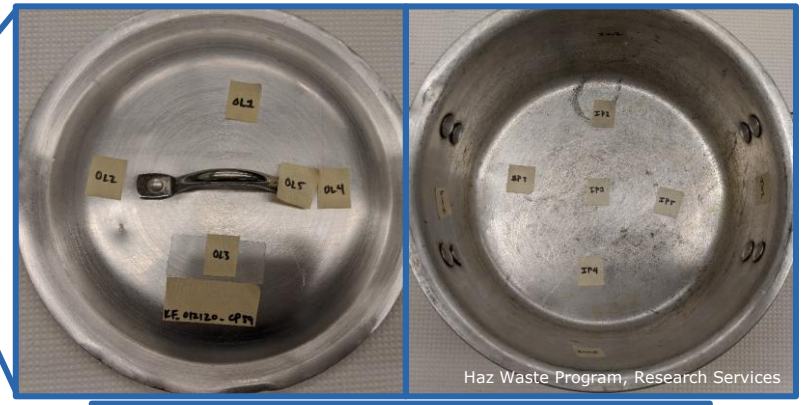
https://www.you


https://www.youtube.com/watch?v=MotZZ6bDh_4

Exposure Study

- Purchased aluminum, brass, cast iron, and stainless-steel cookware in local and online marketplaces; some items donated by Afghan community
- X-Ray Fluorescence: Non-destructive technique to determine elemental composition and quantification
  - Bruker S1 Titan; Restricted Materials Calibration
  - Each pot screened 25-40 times
  - Lid, walls, base, handles, valves, etc.
- Leachate Study
  - 4% acetic acid
  - 15-minute simmer
  - 24 hours at room temperature
  - ICP-MS to quantify heavy metals in leachate
    - Method: EPA 200.8 Metals in Waters by ICP/MS; EHLSOP – 07 Instrumental Analysis of Elements by ICP-MS (based on EPA 6020A Rev.1 2007)
  - Pb, Al, Cr, Mn, Fe, Co, Ni, Cu, As, Cd
  - Estimated Pb/serving: 250 mL leachate
    - FDA Interim Reference Level (IRL): 2.2 µg/day 8.8 µg/day
    - IRLs 'correspond' to a blood lead level (BLL) of 3.5 µg/dL; NOT a health-based limit

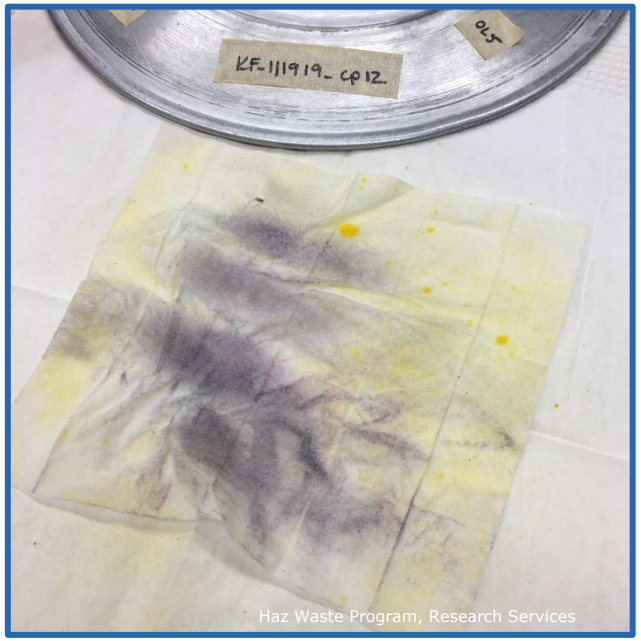


Lead Check Swabs

- Detection limit 0.2% (2,000 ppm)
- Only found a positive result on pressure cooker vent pipes (60,000 - 70,000 ppm)
- Must scrape surface to clean off food/oxide

Full Disclosure Kit

- Developed by NIOSH, CDC
- Detection limit 18 µg
- Only found positive result on surfaces >10,000 ppm Pb
- Must use sandpaper, to generate Pb dust
- Yellow/orange if **-** pink/red if **+**



Fluorescent Kits

Haz Waste Program, Research Services

Results: Aluminum

[1] More than 50% of XRF measurements <LOD
*Estimated dose ≥ child IRL (2.2 µg/day)
** Estimated dose ≥ adult IRL (8.8 µg/day)

Country	Type	XRF, ppm		Leachate 15 mins:	Leachate 24 hours:
		Median	(Range)	Dose, µg/250 mL	Dose, µg/250 mL
Unknown	Cookpot	10[1]	(0, 192)	0.07	0.78
	Cookpot	11[1]	(0, 203)	0.13	0.70
	Cookpot	0[1]	(0, 134)	0.05	0.05
	Caldero	10[1]	(0, 19)	0.16	1.64
	Caldero	11[1]	(0, 124)	0.18	0.99
	Steamer	10[1]	(0, 85)	0.23	**2.83***
	Pr. Cooker	42	(0, 78)	0.69	**7.18***
	Stock Pot	9	(0, 38)	0.01	0.06
Unknown/India	Skillet	387	(8, 489)	**3.73***	**106.00****
	Cookpot	476	(12, 554)	**3.88***	**34.50****
	Pr. Cooker	595	(103, 53,668)	**3.53***	**530.00****
	Pr. Cooker	12[1]	(0, 5,323)	0.25	0.82
Afghanistan	Cookpot	14,318	(7,148, 17,094)	**397.50****	**1,015.00****
	Cookpot	2,807	(803, 4,182)	**20.20****	**35.00****
	Cookpot	8,807	(2,751, 18,599)	**89.75****	**315.00****
	Cookpot	634	(217, 742)	**3.80***	**6.90***
	Cookpot	360	(157, 714)	**38.50****	**68.50****
	Cookpot	4,660	(0, 33,062)	**38.50****	**104.25****
	Cookpot	2,016	(1,469, 56,950)	**29.25****	**92.50****
	Cookpot	3,553	(2,582, 29,429)	**47.75****	**140.00****
	Cookpot	1,533	(0, 43,643)	**6.20***	**8.55***
	Cookpot	301	(0, 440)	**29.50****	**55.25****
	Cookpot	3,117	(662, 28,287)	**12.48****	**47.25****
	Cookpot	4,546	(3,162, 32,612)	**21.93****	**33.00****
	Pr. Cooker	222	(0, 68,926)	**10.55****	**23.93****
	Pr. Cooker	5,063	(0, 40,158)	**64.50****	**146.00****
	Pr. Cooker	393	(0, 43,900)	**16.75****	**26.00****
	Pr. Cooker	556	(8, 37,040)	**48.75****	**1,575.00****
	Pr. Cooker	693	(0, 66,374)	**71.00****	**1,942.50****
	Pr. Cooker	497	(0, 53,425)	**69.75****	**1,777.50****
	Pr. Cooker	538	(0, 48,193)	**45.75****	**990.00****
	Pr. Cooker	605	(0, 64,852)	**48.50****	**1,157.50****
	Pr. Cooker	548	(0, 51,021)	**32.75****	**780.00****

Results: Aluminum

Country	Type	XRF, ppm		Leachate 15 mins:	Leachate 24 hours:
		Median	(Range)	Dose, µg/250 mL	Dose, µg/250 mL
China	Caldero	10[1]	(0, 367)	0.10	1.50
	Caldero	12	(0, 26)	0.19	**2.46***
	Steamer	28	(0, 44)	0.20	**3.45***
	Stock Pot	0[1]	(0, 19)	0.10	0.33
	Stock Pot	50	(0, 94)	0.26	**2.55***
	Cookpot	9[3]	(0, 26)	0.11	0.24
	Cookpot	0[1]	(0, 20)	0.03	0.06
	Cookpot	13	(0, 26)	**3.25***	**5.18***
	Cookpot	8[1]	(0, 18)	0.02	0.07
	Cookpot	28	(10, 260)	0.32	1.63
	Pr. Cooker	8[1]	(0, 147)	0.13	0.90
Colombia	Caldero	96[1]	(0, 225)	**6.80***	**52.50****
	Caldero	138	(0, 183)	**2.38***	**62.25****
	Caldero	13	(0, 71)	0.23	**4.63***
	Caldero	8[1]	(0, 15)	0.19	**3.93***
	Caldero	9[1]	(0, 15)	0.15	**4.18***
	Caldero	7[1]	(0, 17)	0.15	**3.73***
El Salvador	Stock Pot	15	(0, 27)	0.30	**2.63***
India	Pr. Cooker	8[1]	(0, 3,828)	0.02	0.48
	Cookpot	95	(0, 374)	1.80	**15.80****
	Idli Maker	715	(308, 1,327)	**7.00***	**67.50****
Taiwan	Steamer	24	(10, 47)	**53.50****	**56.50****
Thailand	Cookpot	14	(0, 27)	0.46	**3.85***
USA	Stock Pot	11[1]	(0, 19)	0.03	0.47
	Stock Pot	51	(0, 83)	0.04	0.18
	Stock Pot	11[1]	(0, 15)	0.04	0.79
	Dutch Oven	0[1]	(0, 17)	0.21	0.64
Vietnam	Cookpot	0[1]	(0, 34)	0.03	0.08

[1] More than 50% of XRF measurements <LOD *Estimated dose ≥ child IRL (2.2 µg/day) ** Estimated dose ≥ adult IRL (8.8 µg/day)

Results: Hindalium and Brass

Material	Country	Type	XRF, ppm		Leachate 15 mins:	Leachate 24 hours:
			Median	(Range)	Dose, µg/250 mL	Dose, µg/250 mL
Hindalium	India	Idli Maker	626	(81, 1,463)	**4.55***	**33.00****
		Uruli/Kadai	256	(103, 290)	1.09	**6.70***
		Tadka Pan	290	(0, 306)	0.97	**33.75****
		Appam Pan	716	(603, 794)	**3.60***	**3,075.00****
		Kadai	756	(15, 813)	**6.13***	**231.50****
		Kadai	528	(0, 624)	**11.43****	**340.00****
		Unknown	517	(362, 636)	**3.93***	**262.50****
Brass	Thailand	Wok	0[1]	(0, 0)	1.13	1.38
	India	Kadai	5,049	(128, 47,191)	**191.50****	**335.00****
		Saucepan	0[1]	(0, 1,182)	**19.75****	**32.25****
		Tope	1,343	(1,012, 1,544)	**104.50****	**182.00****
		Pital Pot	3,611	(2,859, 4,585)	**1,430.00****	**2,700.00****

[1] More than 50% of XRF measurements <LOD *Estimated dose ≥ child IRL (2.2 µg/day) ** Estimated dose ≥ adult IRL (8.8 µg/day)

Results: Cast Iron

Material	Country	Type	XRF, ppm		Leachate 15 mins:	Leachate 24 hours:
			Median	(Range)	Dose, µg/250 mL	Dose, µg/250 mL
Enamel	China	Dutch Oven	0[1]	(0,21)	0.11	0.13
		Dutch Oven	26[1]	(0,71)	0.11	0.13
		Dutch Oven	0[1]	(0, 104)	0.13	0.15
		Dutch Oven	0[1]	(0, 218)	0.15	0.15
		Dutch Oven	0[1]	(0,4)	0.15	0.18
		Dutch Oven	11[1]	(0, 202)	0.22	0.25
		Dutch Oven	39[1]	(0, 563)	0.30	0.33
		Dutch Oven	22[1]	(0, 190)	0.77	0.90
Pre-Seasoned	China	Skillet	0[1]	(0, 71)	0.31	0.05
		Dutch Oven	0[1]	(0,49)	0.01	<0.025
		Dutch Oven	0[1]	(0, 93)	0.06	<0.025
		Dutch Oven	0[1]	(0, 84)	0.01	<0.025
		Dutch Oven	4[1]	(0, 38)	0.01	<0.025
		Skillet	0[1]	(0, 45)	0.13	<0.025
		Skillet	0[1]	(0, 56)	0.10	<0.025
		Skillet	0[1]	(0, 51)	0.04	<0.025
		Skillet	0[1]	(0,55)	0.01	<0.025
	Pakistan	Skillet	0[1]	(0,45)	0.09	<0.025
	USA	Dutch Oven	0[1]	(0, 61)	<0.0025	<0.025
		Skillet	1[1]	(0, 46)	0.02	<0.025

[1] More than 50% of XRF measurements <LOD *Estimated dose ≥ child IRL (2.2 µg/day) ** Estimated dose ≥ adult IRL (8.8 µg/day)

Results: Stainless Steel

Country	Type	XRF, ppm		Leachate 15 mins:	Leachate 24 hours:
		Median	(Range)	Dose, µg/250 mL	Dose, µg/250 mL
China	Frying Pan	17[1]	(0, 46)	0.15	0.16
	Pr. Cooker	13[1]	(0, 104)	0.38	0.02
	Pr. Cooker	17[1]	(0, 86)	0.05	0.05
	Pr. Cooker (electric)	13[1]	(0, 106)	NA	NA
	Pr. Cooker (electric)	15[1]	(0, 87)	0.05	0.06
	Sauce Pan	11[1]	(0, 53)	0.06	0.07
	Sauce Pan	17[1]	(0, 97)	0.06	0.07
	Sauce Pan	22[1]	(0, 69)	0.08	0.09
	Sauté Pan	11[1]	(0, 62)	0.06	0.06
	Stock Pot	16[1]	(0, 84)	0.05	0.05
	Stock Pot	5[1]	(0, 79)	0.03	0.04
	Stock Pot	36[1]	(0, 75)	0.03	0.03
India	Pr. Cooker	1[1]	(0, 55,009)	0.08	0.14
	Pr. Cooker	27[1]	(0, 53,294)	0.36	0.40
	Pr. Cooker	8[1]	(0, 4,124)	0.41	0.52
	Pr. Cooker	17[1]	(0, 4,040)	0.08	0.41
Spain	Pr. Cooker	15[1]	(0, 132)	0.15	0.14
Unknown	Pr. Cooker	20[1]	(0, 77)	0.08	0.08
	Pr. Cooker	20[1]	(0, 70)	0.04	0.05
	Sauce Pan	0[1]	(0, 41)	0.06	0.07
	Sauce Pan	0[1]	(0, 58)	0.17	0.19
	Saucepan	9[1]	(0, 84)	NA	NA
	Saucepan	6[1]	(0, 58)	NA	NA
	Skillet	12[1]	(0, 85)	NA	NA
	Skillet	0[1]	(0, 28)	0.22	0.23
	Stock Pot	9[1]	(0, 91)	NA	NA
	Stock Pot	0[1]	(0, 67)	0.08	0.08

[1] More than 50% of XRF measurements <LOD

Safer!

Alerting the Government

U.S Food and Drug Administration

CONSUMER PRODUCT SAFETY COMMISSION
UNITED STATES

AFGHANISTAN

RASHKO BABA
Date Published : 03/24/2022
5th District Comapny Square Baghedawood Road , Kabul, AFGHANISTAN
52 A - - 54 Soup Pan/Pot, Roasting Pan, etc (Deep item capable of holding liquid w/ or w/o lid) Food/Cook/Table
Date Published: 01/26/2023
Desc: Pressure cooker
Problems: LEAD;
52 A - - 99 Kitchen and Tableware, n.e.c., (Foodware, Cookware & Tableware)
Date Published: 03/24/2022
Desc: Pressure cooker
Problems: LEAD;

RASHKO BABA CO LTD
Date Published : 03/24/2022
Eno D 21353 , Jalalabad, AFGHANISTAN
52 A - - 54 Soup Pan/Pot, Roasting Pan, etc (Deep item capable of holding liquid w/ or w/o lid) Food/Cook/Table
Date Published: 01/26/2023
Desc: Pressure cooker
Problems: LEAD;

FDA U.S. FOOD & DRUG ADMINISTRATION

Search

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Letter to Retailers and Distributors of Cookware

Environmental Contaminants in Food

Arsenic in Food

Lead in Food

December 12, 2024

Dear Retailers and Distributors of Cookware:

The U.S. Food and Drug Administration (FDA or we) is issuing this letter to inform you that certain imported cookware may leach lead (Pb) into food and that this cookware should not be distributed or sold in the U.S. market.

Content current as of:
12/12/2024

Regulated Product(s)
Food &

Retailers

- Wrote letters to Amazon & Etsy (with Washington State Attorney General's Office)
- Reported products on eBay's regulatory portal
- Met with Amazon's attorneys
- Amazon pulled all noted cookware
- eBay and Etsy pulled most
- FDA provided lead in cookware guidance to Amazon

amazon

Etsy

ebay

Public Education + Media

- Engaging CBOs
- Educating community
- Cookware exchange program
- Cooking videos with Instant Pots (Dari & Pashto)
- Informing the media
- Engaging global aid organizations on root cause & solutions

Afghan Health Initiative
Promoting Health through Lived Experience

Policy Change: HB 1551

- Second Substitute House Bill 1551
  - AN ACT Relating to **reducing lead in cookware**; reenacting and amending RCW 43.21B.110 and 43.21B.300; adding a new chapter to Title 70A RCW; and prescribing penalties.
  - Section 1 establishes definitions.
  - Section 2:
    - (1) **Beginning January 1, 2026**, no manufacturer may manufacture, sell, offer for sale, distribute for sale, or distribute for use in this state cookware or a cookware component containing lead or lead compounds at a level of more than **five parts per million**.
    - (2)(a) Beginning January 1, 2026, no retailer or wholesaler may knowingly sell or knowingly offer for sale for use in this state cookware or a cookware component containing lead or lead compounds at a level of more than five parts per million. (b) Retailers or wholesalers who unknowingly sell products that are restricted from sale under this chapter are not liable under this chapter. (c) The sale or purchase of any previously owned cookware or cookware components containing lead made in casual or isolated sales as defined in RCW 82.04.040, or by a nonprofit organization, is exempt from this chapter.
    - (3) After December 2034, the department, in consultation with the **department of health, may lower the five part per million limit** established in subsection (1) of this section by rule if it determines that the lower limit is: (a) Feasible for cookware and cookware component manufacturers to achieve; and (b) Necessary to protect human health, including the health of vulnerable populations.
  - Section 3 states the department may adopt rules, sets penalties, etc…
- First law of its kind to limit lead content for metal cookware

Policy Change: HB 1551

Policy Change: SB 5628

- Engrossed Substitute Senate Bill 5628
  - AN ACT Relating to lead in cookware; and amending RCW 70A.565.010 and 70A.565.020.
  - Section 1 amends the previous law, specifying that it refers to **aluminum or brass** cookware and cookware components, and expands to include **utensils**. It further excludes internal layers (e.g., stainless-steel clad cookware).
  - Section 2 **amends** the previous law:
    - (1) Beginning January 1, 2026, no manufacturer may manufacture, sell, offer for sale, distribute for sale, or distribute for use in this state **aluminum or brass** cookware, **aluminum or brass utensils**, or ((a)) **an aluminum or brass** cookware component containing lead or lead compounds at a level of more than ((~~five~~)): **(a) 90 parts per million, beginning January 1, 2026**; **and (b) 10 parts per million, beginning January 1, 2028**…
    - (3) After December ((~~2034~~)) **2030**, the department, in consultation with the department of health, may lower the ((~~five~~)) **10** parts per million limit established in subsections (1) and (2) of this section by rule if it determines that the lower limit is: (a) Feasible for cookware and cookware component manufacturers to achieve; and (b) Necessary to protect human health, including the health of vulnerable populations.
    - (4) Nothing in this chapter limits the authority of the department with respect to lead in cookware, cookware components, or utensils under chapter 70A.350 RCW.
- Still the most health protective bill for metal cookware; gets rid of 'worst actors' while allowing industry time to comply.

Policy Change: SB 5628

CERTIFICATION OF ENROLLMENT

ENGROSSED SUBSTITUTE SENATE BILL 5628

Chapter 266, Laws of 2025

69th Legislature
2025 Regular Session

LEAD IN COOKWARE—MODIFICATION

EFFECTIVE DATE: July 27, 2025

Passed by the Senate April 22, 2025
Yeas 48 Nays 0

DENNY HECK
President of the Senate

Passed by the House April 18, 2025
Yeas 95 Nays 0

LAURIE JINKINS
Speaker of the House of Representatives

Approved May 13, 2025 10:26 AM

BOB FERGUSON
Governor of the State of Washington

CERTIFICATE

I, Sarah Bannister, Secretary of the Senate of the State of Washington, do hereby certify that the attached is **ENGROSSED SUBSTITUTE SENATE BILL 5628** as passed by the Senate and the House of Representatives on the dates hereon set forth.

SARAH BANNISTER
Secretary

FILED

May 14, 2025

Secretary of State
State of Washington

https://www.lssphotos.com/p830598907

Publications

- Fellows KM, Samy S, Rodriguez Y, Whittaker SG. Investigating aluminum cookpots as a source of lead exposure in Afghan refugee children resettled in the United States. J Expo Sci Environ Epidemiol 32, 451–460 (2022). https://doi.org/10.1038/s41370-022-00431-y
- Fellows KM, Samy S, Whittaker SG. Evaluating metal cookware as a source of lead exposure. J Expo Sci Environ Epidemiol (2024). https://doi.org/10.1038/s41370-024-00686-7
- Porterfield K, Hore P, Whittaker SG, Fellows KM, Mohllajee A, Azimi-Gaylon S, et al. 2024. A snapshot of lead in consumer products across four US jurisdictions. Environ Health Perspect 132(7):075002, https://doi.org/10.1289/EHP14336

News Articles

- Dangerous cookware still for sale despite warnings from King County health experts: https://www.king5.com/article/news/investigations/dangerous-cookware-for-sale-warnings-health-experts/281-48cb6121-9b12-44d2-9648-8aed67ad541a
- Amazon removes potentially dangerous cookware from website: https://www.king5.com/article/news/investigations/amazon-removes-afghan-pressure-cookers/281-b41a9a3f-dcdf-4bd8-b7f7-520254c8beeb
- Cookware containing dangerous amounts of lead still being sold online after expert warnings: https://www.king5.com/article/news/investigations/cookware-dangerous-amounts-lead-still-sold-online-expert-warnings/281-b05e3870-046b-4cb0-bd1b-2fc812229d61
- Lawmakers pass bill to ban sales of cookware contaminated with lead in Washington: https://www.king5.com/article/news/politics/state-politics/washington-lawmakers-to-ban-sales-cookware-contaminated-lead/281-09d24ac4-c132-4809-a89b-11b27e7807e6
- 'A huge win': Washington becomes first state to regulate lead content in metal cookware: https://www.king5.com/article/news/investigations/investigators/washington-becomes-first-state-to-regulate-lead-content-metal-cookware/281-7d9d1fd3-7f05-4085-af3d-ec0ec72252a6
- Despite an incoming Washington state law, lead-ridden imported cookware remains for sale: https://www.king5.com/article/news/investigations/investigators/lead-imported-cookware-remains-for-sale-before-washington-state-law/281-84d5882b-122f-4255-91d3-b27dc8343a05

Additional Resources

- FDA says "Cookware that exhibits any level of leachable lead upon testing is prohibited.": https://blogs.edf.org/health/2023/08/15/fda-says-cookware-that-exhibits-any-level-of-leachable-lead-upon-testing-is-prohibited/
- WA becomes first state to ban lead-contaminated cookware: https://www.seattletimes.com/seattle-news/health/wa-becomes-first-state-to-ban-lead-contaminated-cookware/
- First-in-nation ban on lead in cookware signed by Washington state's governor: https://toxicfreefuture.org/press-room/first-in-nation-ban-on-lead-in-cookware-signed-by-washington-states-governor/
- Lead in food: Washington state acts on metal cookware in face of FDA inaction: https://unleadedkids.org/lead-in-food-washington-state-acts-on-metal-cookware-in-face-of-fda-inaction/2024/04/12/
- Metal cookware: a previously unrecognized source of lead exposure in the United States: https://communities.springernature.com/posts/metal-cookware-a-previously-unrecognized-source-of-lead-exposure-in-the-united-states
- Lead in products: Local efforts shine critical light; benefits could drive larger change: https://unleadedkids.org/open-data/2024/06/13/
- FDA Letter to Retailers and Distributors of Cookware: https://www.fda.gov/food/hfp-constituent-updates/fda-issues-letter-retailers-and-distributors-concerning-lead-certain-imported-cookware

Thank You!

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  - Monica Ayers
  - Pam Johnson
- University of Washington
  - Shar Samy - Environmental Health Lab Manager
  - Yoni Rodriguez – Graduate Student Intern (DEOHS)
  - Abigail Gilbert – Graduate Student Intern (DEOHS)
- Afghan Health Initiative
- Washington State Department of Health
- Public Health-Seattle & King County - Lead & Toxics Program

Contact

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King County Hazardous Waste Management Program

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