Enabling Drinking Water: Challenges and solutions

Champion Provider Fellowship
September 26, 2024

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About me

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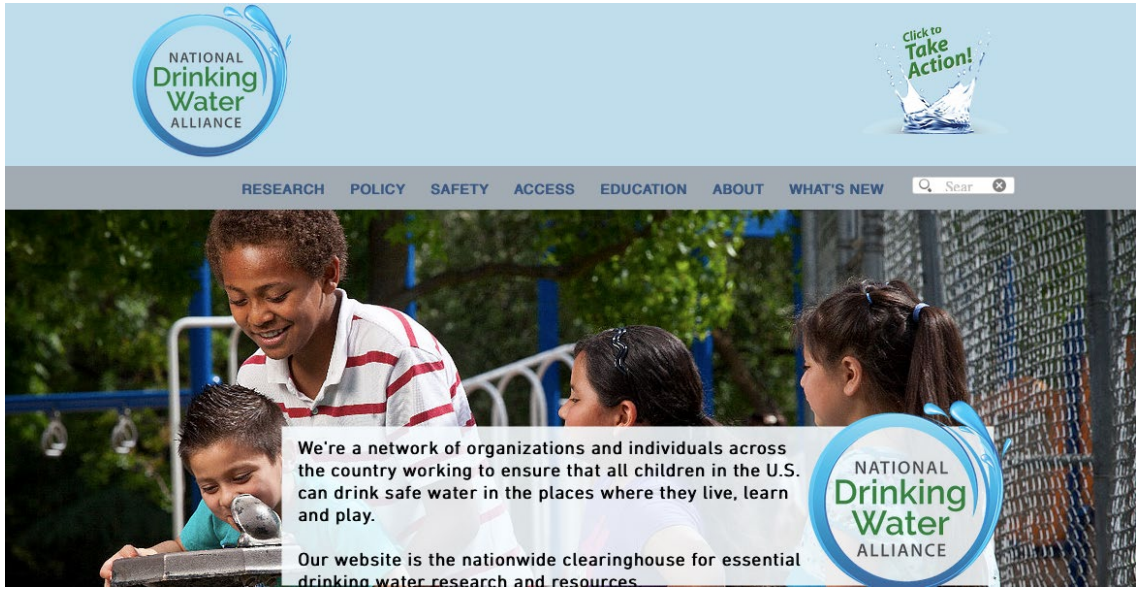

National Drinking Water Alliance

https://DrinkingWaterAlliance.org

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Why does beverage choice matter?

Sugary drinks are harmful to **humans**

- **Health**
  - Added sugars
  - Empty calories
  - Risk factor for many chronic diseases
- **Equity**
  - Targeted marketing, consumption, health impacts

Sugary drinks are harmful to **our planet**

- **Environment**
  - Use lots of water
  - Greenhouse Gas Emissions (GHGE)
  - Top plastic polluters

Meisterling K et al. 2022

Al-Zalabani et al., 2019; Bleich et al., 2018; Chazelas et al., 2019; Chen et al., 2019; Chi & Scott, 2018; Collin et al., 2019; DGAC Scientific Report, 2020; Huang et al., 2014; Imamura et al., 2015; Malik et al., 2010; Malik et al., 2020; Mattes 2006; Mullee et al., 2019; Narain, Kwok & Mamas, 2017; Reedy 2010; Rudd Center, 2022; Seferidi, Millet & Laverty, 2018; Sohn, Burt & Sowers, 2006; USDA, 2020; Varraso & Camargo, 2019; Vos et al., 2017; Yang et al., 2014

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ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

playeverday.alaska.gov

PLAY EVERY DAY

Today's learning objectives:

(1) Recognize factors that facilitate and support choosing water as a beverage of choice

(2) Explain key concerns about drinking water safety

(3) Understand what is known and what is being done about lead in California tap water

(4) Identify resources for educating communities about drinking water

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Elements that enable drinking water

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Enabling water consumption

Safety
- Lead & other contaminants
- Trust

Access
- Location
- Condition
- Affordability

Promotion
- Education
- Messaging

Policy

Photo courtesy of Alaska DHSS

Patel et al., 2014; Muckelbauer et al., 2009; Kenney et al., 2015; Patel et al., 2020; Patel et al., 2023

Access + promotion ➔ consumption

+

Recent RCT in CA schools found

- Significant improvements in water intake
- Intervention students had 70% lower odds of overweight compared to control

Patel et al. (2023)

Laws governing school access and promotion:

CA SB 1413 & AB 2084 - 2010
US HHFKA – 2010
CA AB 2638 - 2022

Stanford MEDICINE

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Drinking water safety:

Basics & key concerns

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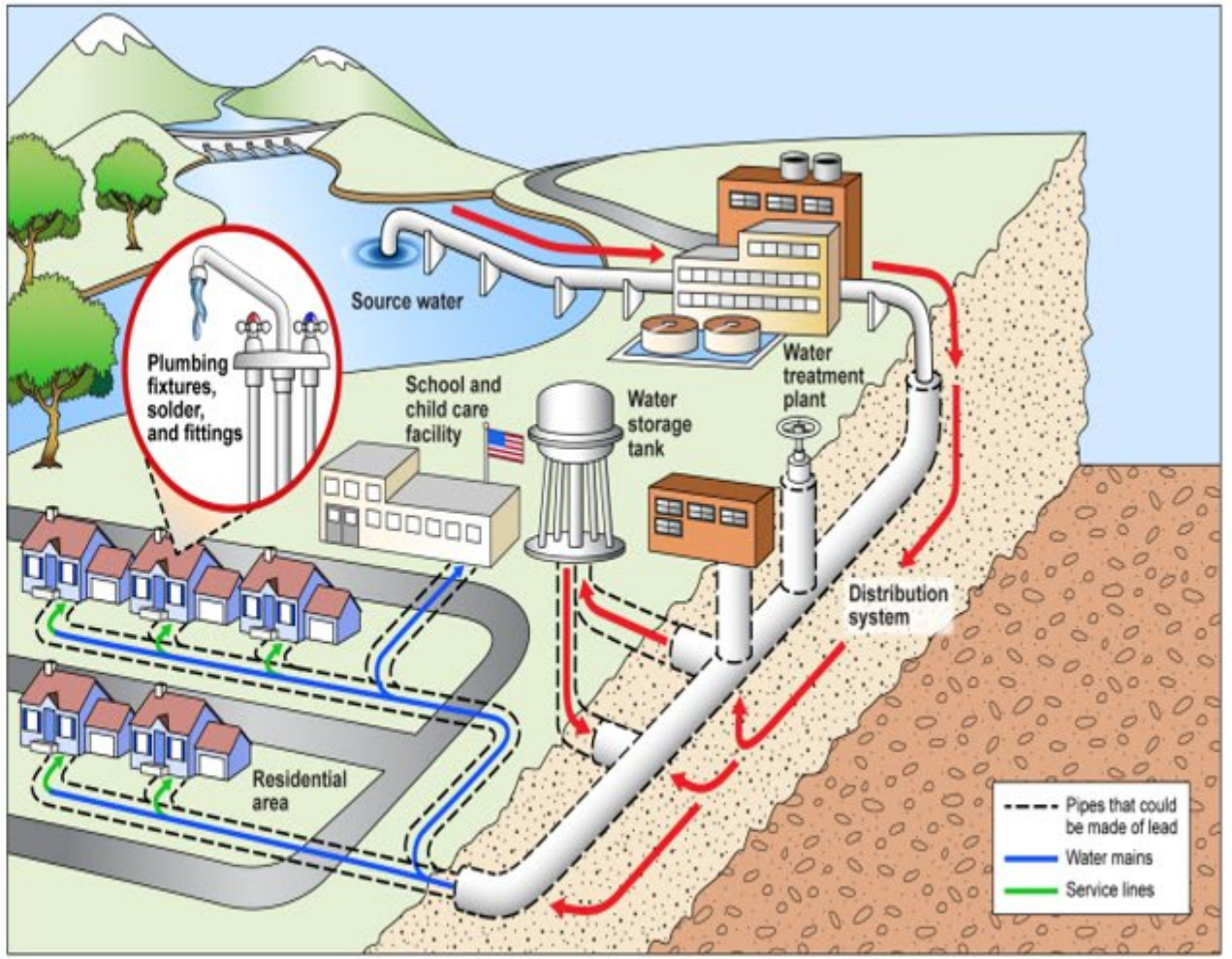
Water Quality 101

Source water

- Water system
  - Federal and state regulations
- Private well
  - Responsibility of owner

US laws governing drinking water safety:

Clean Water Act – 1972
Safe Drinking Water Act – 1974 & 1996
EPA Lead & Copper Rules



Source: GAO. | GAO-12-424

Patel et al., 2020

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Most CA water systems meet DW standards

- California has 3,226 water systems serving almost 40 million people.
- In any given year, several hundred do not meet health standards.
- This is about the same as nationally.
- Rural and low-income areas are most likely to have failing water systems.

PPIC, 2021

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California contaminants of concern?

Contaminant	Source	Health impacts	EPA (CA) MCL	PHG
Arsenic	Pesticides; naturally occurring in groundwater	Carcinogen (skin, bladder, liver, lung); IQ, growth, & development; skin warts, discoloration	10 ppb	0.004 ppb
Nitrate	Fertilizers; human waste	Limits ability of blood to transport oxygen	10 ppm	10 ppm
Chromium-6	Naturally occurring; industrial pollution	Carcinogen (lung and others); liver, male and female reproductive and developmental damage	100 ppb (10 ppb)	0.02 ppb
PFAS	Industrial pollution	Varied organ and systemic effects	4-10 ppt	0.01-0.000007 ppb
1,2,3-TCP	Industrial pollution	Carcinogen	None (5 ppt)	0.7 ppt

CalEPA 4/2024

EPA regs for 6 PFAS 4/2024

CA SWRCB 2017

CDC; CA State Water Resources Control Board

Why do people mistrust tap water?

Concern	Response?
Poor organoleptics.	Teach about “potable” *vs.* “palatable” water. Chill, add fruit or veg slices, or filter.
Water quality issues in the area.	Understand the facts (CCR). Filter or purchase.
Water quality issues in consumer’s past experience.	Educate on actual area quality (CCR).
Water quality crises in news.	Educate on actual area quality (CCR).
Lack of familiarity with water source.	Investigate local utility’s tours, outreach and education.
Low trust in public agencies/services.	Educate on actual area quality (CCR).
History of marginalization.	Recognize & respect.

Wilson et al., 2022; Grupper et al., 2021; Hobson et al., 2007; Pierce & Gonzalez, 2017; Santillán-Vázquez et al., 2022; Estradé, et al., 2024

Lead in CA tap water:

What do we know & what is being done?

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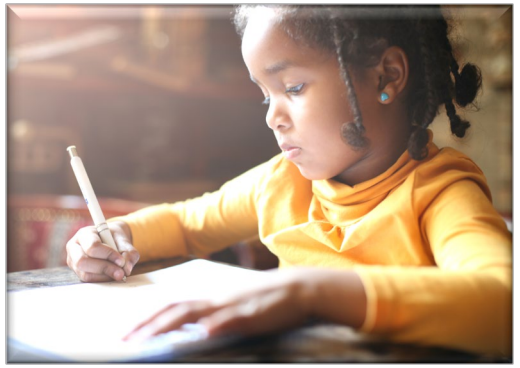
Why the concern with lead?

Lead exposure:

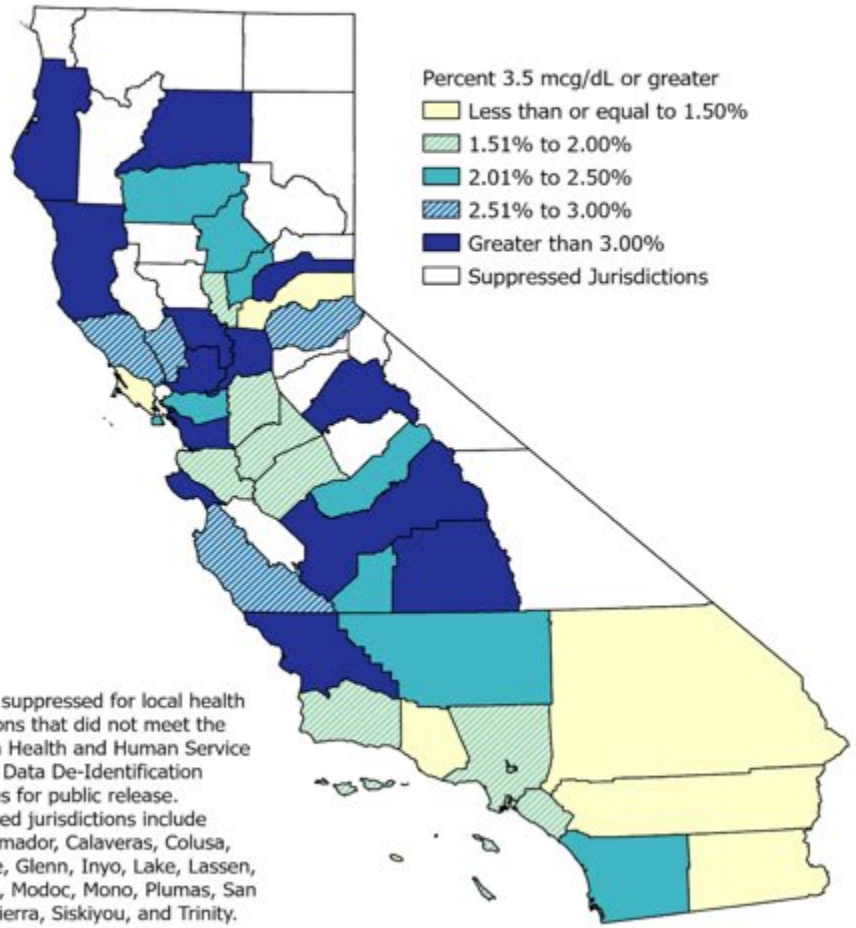
- Can slow down growth and development
- Can damage hearing and speech
- Can make it difficult to pay attention and learn
- Can harm a child's nervous system and brain development
- Can lead to a low blood count (anemia)



Children particularly under age 6, are most vulnerable

Children's blood lead levels

Figure 1. Percent of Children Under 6 Years Old with a Blood Lead Level of 3.5 µg/dL or Greater, by California Local Health Jurisdiction, 2022



Data are suppressed for local health jurisdictions that did not meet the California Health and Human Service Agency's Data De-Identification Guidelines for public release. Suppressed jurisdictions include Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lake, Lassen, Mariposa, Modoc, Mono, Plumas, San Benito, Sierra, Siskiyou, and Trinity.

US children under age 6 (NHANES)

- 1976 median BLL is 15 mcg/L
- 2019 median BLL is 0.6 mcg/dL

CA children under age 6 (CDPH surveillance)

- 98% have BLL under 3.5 mcg/dL
- 13 counties report more than 3% of children have BLL of 3.5 mcg/dL or greater

CDC reference value is 3.5 mcg/dL as of 2021

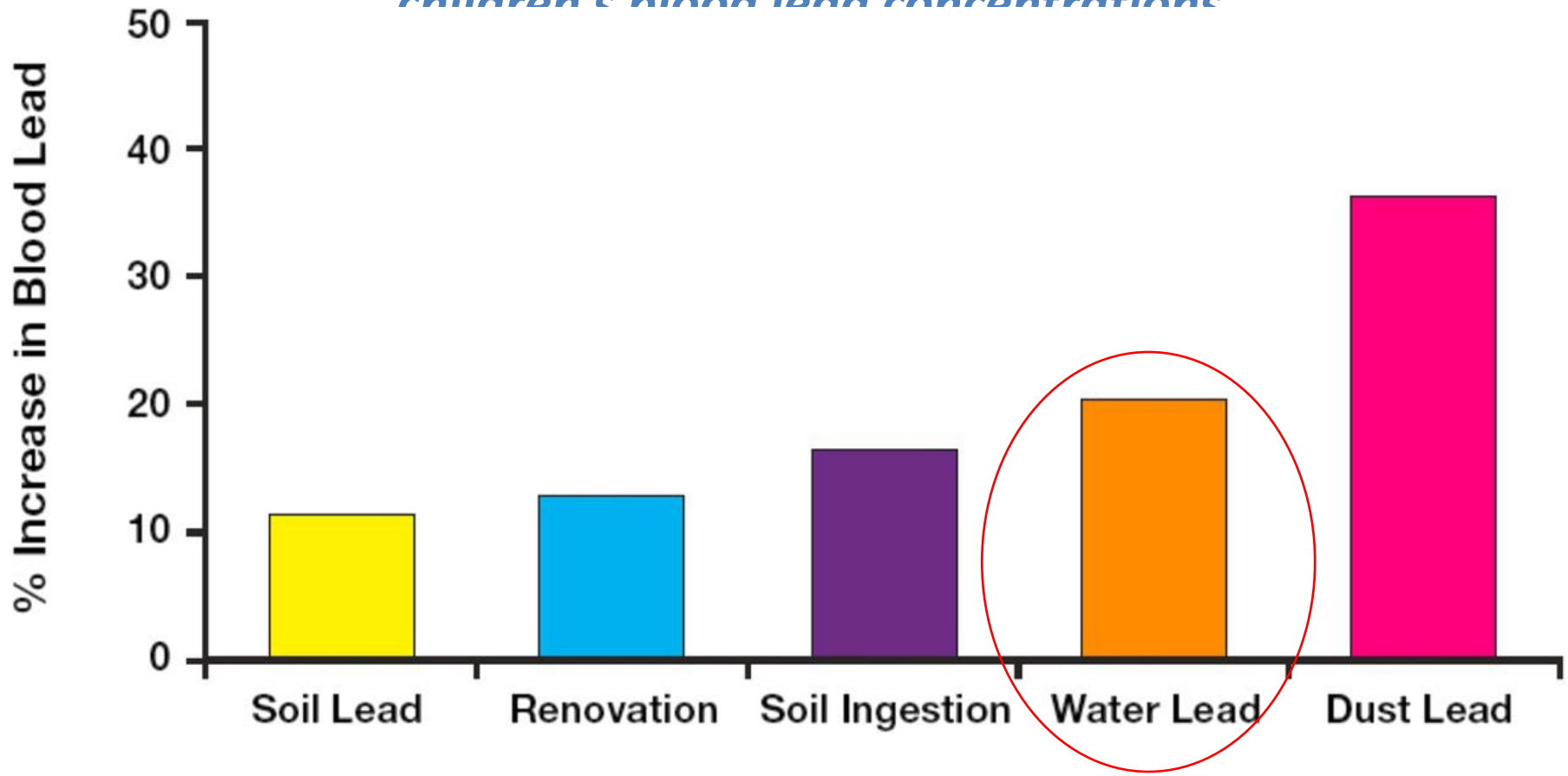
- (Was 4.5 mcg/dL)

Graphic: CDPH 2024

EPA, 2023; CDPH, 2024; CDC, 2024

Primary sources of lead exposure

Contribution of lead exposure to children's blood lead concentrations



American Academy of Pediatrics Council on Environmental Health, 2016

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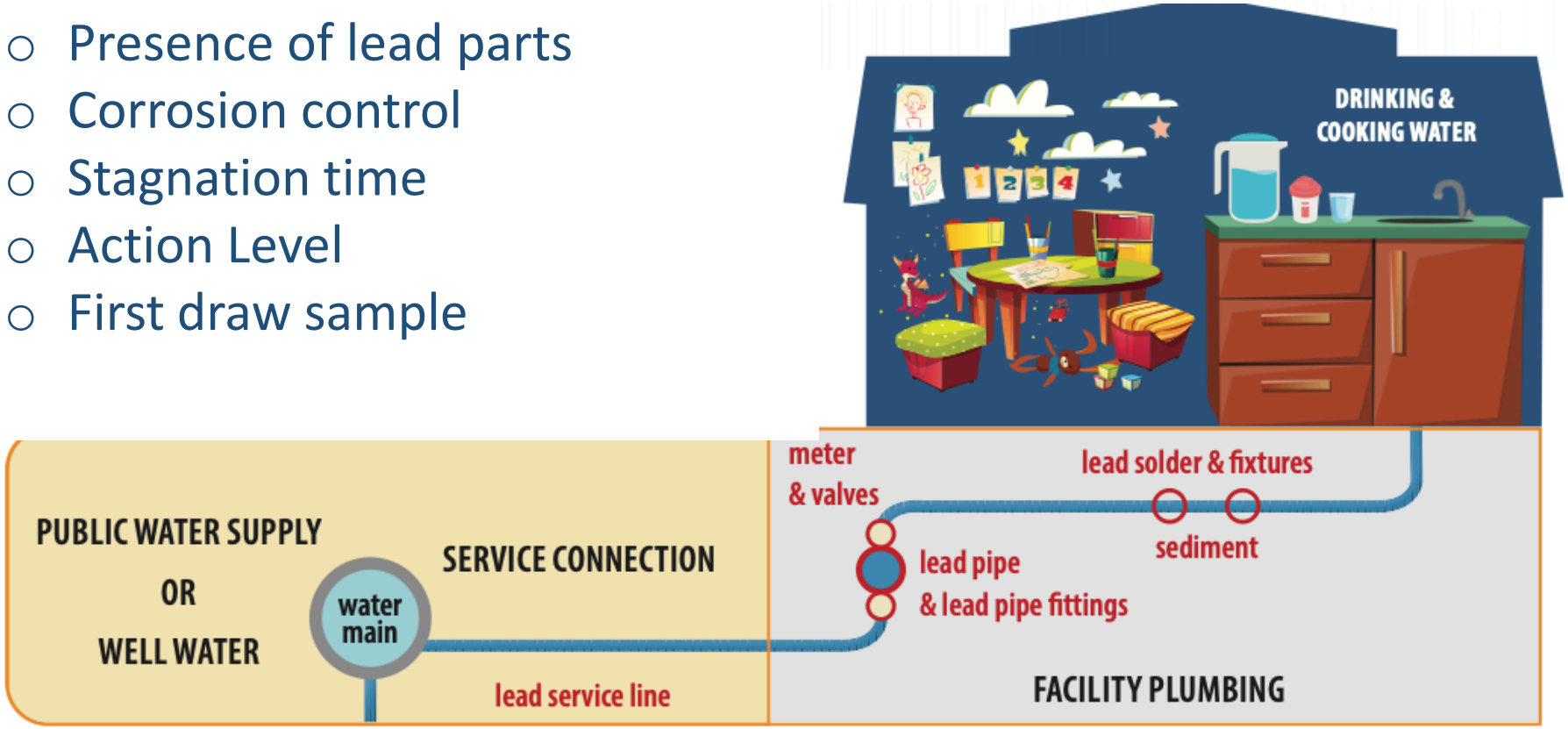
Most at risk: Formula-fed infants

- 60% of infants 0-5 mos. are formula-fed
- Consume up to 4 cups/day
- 40-60% of exposure to lead is through water used to mix formula

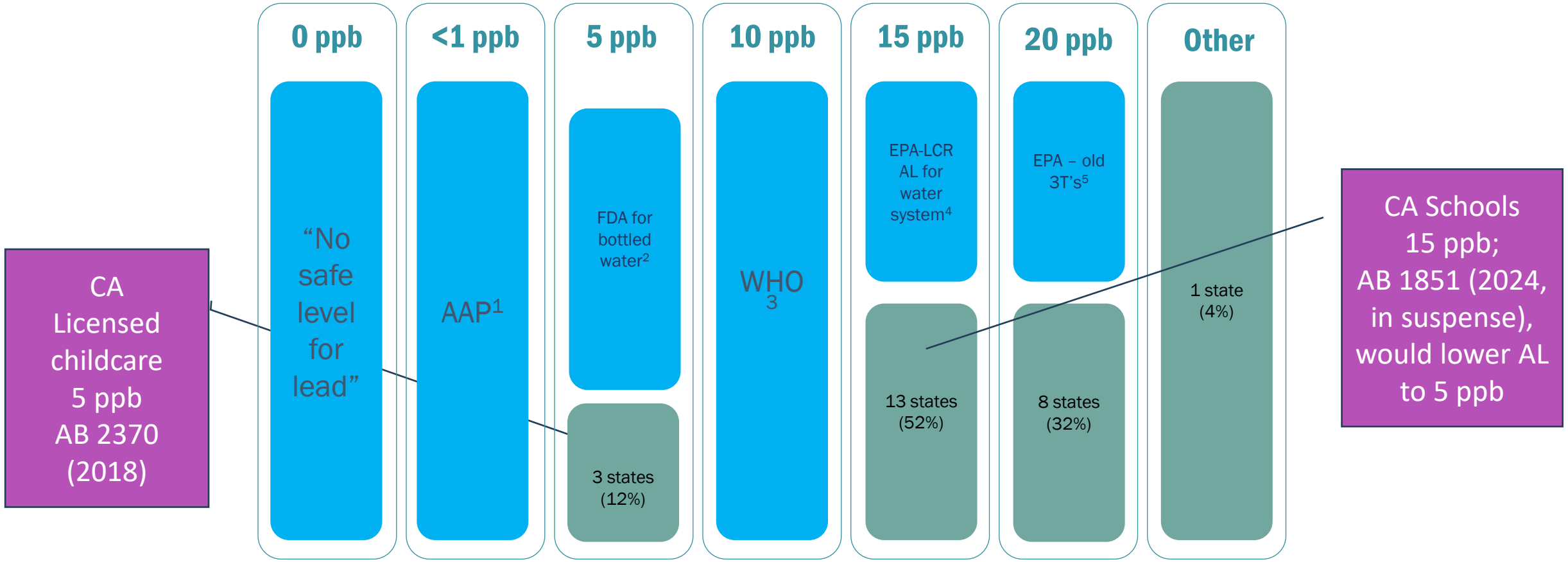
Miles & Siega-Riz 2017; Shannon and Graef, 1992; EPA

Potential for lead in tap water

- Presence of lead parts
- Corrosion control
- Stagnation time
- Action Level
- First draw sample



Action levels for lead in drinking water



[1]American Academy of Pediatrics (AAP) COUNCIL ON ENVIRONMENTAL HEALTH. Prevention of Childhood Lead Toxicity. Pediatrics. 2016;138(1):e20161493. AAP available at http://pediatrics.aappublications.org/content/pediatrics/138/1/e20161493.full.pdf

[2]Food and Drug Administration (FDA) 21 CFR § 165.110. Subpart B- Requirements for Specific Standardized Beverages (CFR 2016) Title 21- volume2-section 165.110 available at https://www.govinfo.gov/content/pkg/CFR-2016-title21-vol2/pdf/CFR-2016-title21-vol2-sec165-110.pdf [accessed September 19, 2018].

[3]Guidelines for drinking-water quality: fourth edition incorporating the first addendum. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO. Available at http://apps.who.int/iris/bitstream/handle/10665/254637/9789241549950-eng.pdf;jsessionid=3881FE535AD164B693E889262390B0A1?sequence=1%20Guidelines%20for%20-%20apps.who.int. [Accessed September 19, 2018]

[4]EPA (Environmental Protection Agency). Title 40 Chapter I Subchapter D §141.80 General requirements. United States Environmental Protection Agency; 2018. Available at https://www.ecfr.gov/cgi-bin/text-idx?SID=531617f923c3de2cbf5d12ae4663f56d&mc=true&node=sp40.23.141.i&rgn=div6#se40.25.141_180. [Access date September 19, 2018].

[5]EPA (Environmental Protection Agency). 3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance. United States Environmental Protection Agency; 2006.

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Lead in drinking water: U.S. schools

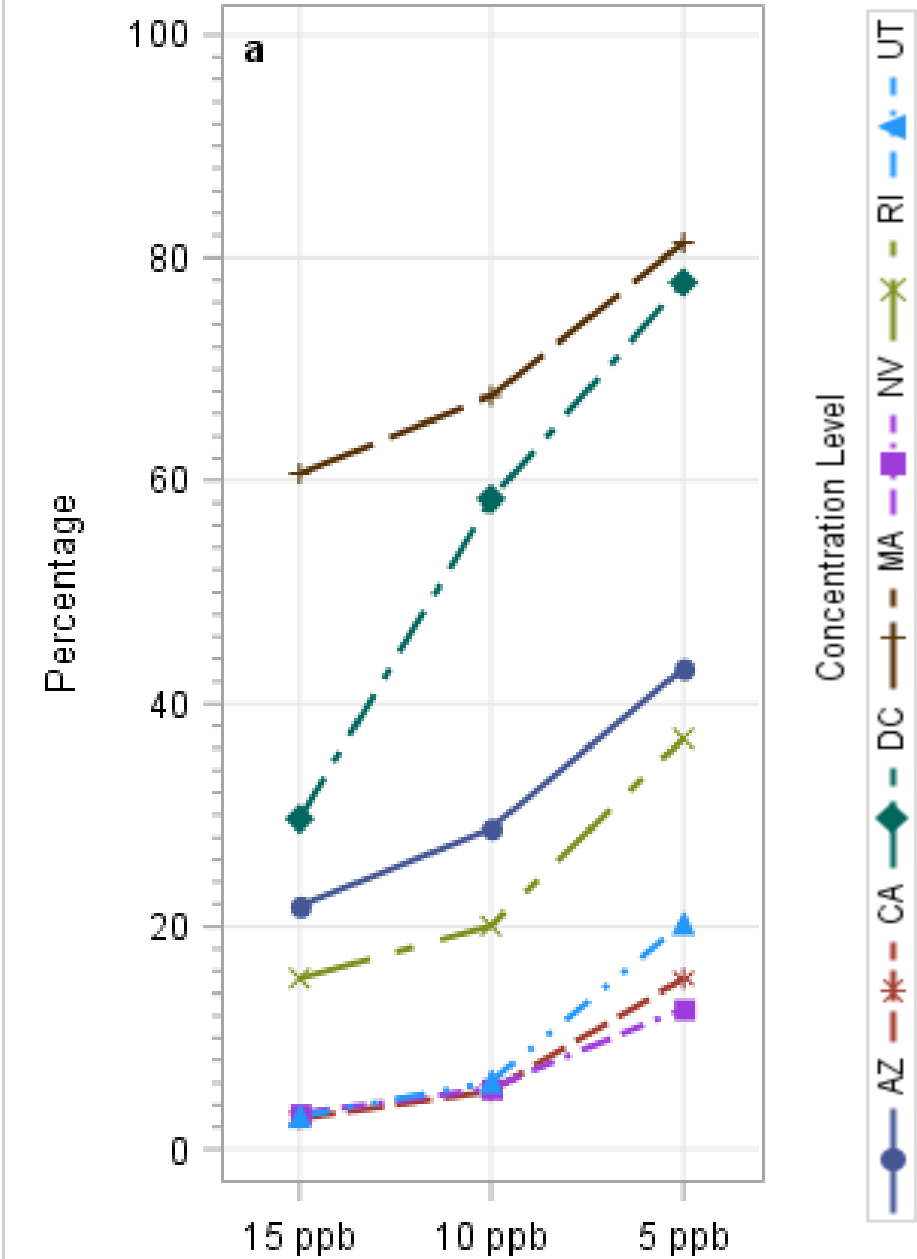
Analyzing all available data (2018) at 15, 10, and 5 ppb of lead, school-level

- Great variability
- California among the lowest

Cradock et al., 2019;
Cradock et al., 2022

US legislation on lead in school DW testing and remediation:

WIIN 2016 - testing
ILJA 2021 – testing & remediation



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Lead in drinking water: California schools

CA State Water Board: *"<5% of all schools had at least one AL exceedance."*

Study: 250 taps in 83 CA schools

Impact of a denominator

% of *schools* with at least one tap with lead over:	15 ppb CA AL	5 ppb FDA bottled water	1 ppb AAP recommendation
First draw	4%	18%	75%
Flush sample (45 sec.)	2%	10%	33%
% of *taps* with lead over:	15 ppb CA AL	5 ppb FDA bottled water	1 ppb AAP recommendation
First draw	1%	7%	41%
Flush sample (45 sec.)	0.8%	4%	15%

Impact of flushing on incidence of elevated levels

Impact of a lower AL on remediation needs

CA legislation on lead in school DW:

AB 746 (2017)
AB 249 - (2023-vetoed)
AB 1851 (2024-suspense)

Umunna et al., 2021;
Garvey, 2024;
CA SWRCB, 2024

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Virginia Tech

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Lead in drinking water: California licensed childcare

There is no peer-reviewed study analyzing the results of California's program to test for lead in drinking water in licensed childcare centers.

There is no national study reviewing the evidence from childcare sites.

CA legislation on lead in licensed childcare DW (testing, remediation, AL):

CA AB 2370 - 2018

Lead test findings for first draw samples at 63,180 taps in CA licensed childcares, per AB 2370

Lead in ppb	Number of taps	% of taps
5.56->10,000	4,850	7.7%
0-5.5	58,365	92.4%

CA SWRCB, 2024; personal analysis

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Lead in drinking water: California homes

Lead Levels in µg/L (ppb)	Number of Individual Sample Measures	% of Total Number of Individual Samples	Cumulative % of Samples
0 (< MRL)	46,704	87%	87%
0 < LLs ≤ 5	4,450	8%	95%
5 < LLs ≤ 10	1,527	3%	98%
10 < LLs ≤ 15	418	1%	99%
LLs > 15	655	1%	100%
TOTAL	53,754	100%	-

SWRCB: Distribution of lead tap sampling results, CA, 1/2021-12/2023

CA SWRCB, 2024, p.c.

State Water Resources Control Board

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Tips & Resources

for educating communities

And some action steps!

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Only milk and water, please!

Recommendations for ages 6-18 coming

HealthyDrinksHealthyKids.org

Robert Wood Johnson Foundation
Academy of Nutrition and Dietetics
American Academy of Pediatrics
American Heart Association
American Academy of Pediatric Dentists

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Sample Annual Water Quality Report

Contaminant (units)	MCL	MCLG	Average Detected/ Your Water	Range Detected	Violation (Y/N)	Major sources in drinking water	Health effects language
MICROBIOLOGICAL CONTAMINANTS							
Total Coliform Bacteria	<5%	0	ND	N/A	N	Naturally present in the environment	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
INORGANIC CONTAMINANTS							
Barium (ppm)	2	2	0.01	N/A	N	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Nitrate (ppm)	10	10	0.18	0.12 - 0.24	N	Runoff from fertilizer use; Leaching from septic tanks, sew age; Erosion of natural deposits	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
DISINFECTION CHEMICALS							
	MRDL	MRDLG					
Chlorine (ppm)	4	4	1.2	0.8 - 1.4	N	Water additive to control	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink

Understanding utility water quality

- Know your local utility
- Teach how to read the Consumer Confidence Report
  - Resources by EPA, CDC, Community Water Center

Graphic: Screenshot from National Sanitation Foundation (NSF)

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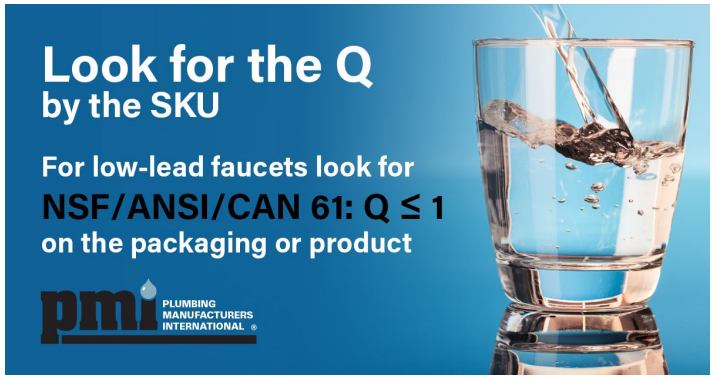
Basic water safety tips to reduce lead risk

- Check age of your house and its plumbing, and presence of a lead service line
- Only use water from the cold tap for drinking and cooking
- For taps with aerators, clean the aerators using best practices
- Fresher water is safer water
  - Flush all drinking and cooking water taps briefly (30 seconds to 2 minutes) when they have not been used for 6 hours – overnight

Laws governing lead in plumbing:

EPA Lead & Copper Rule
CA AB 100 (2021)



NSF/ANSI/CAN 61: Q ≤ 1

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Do you need filtered water?

- Determine water quality
  - CCR + lead test
  - Taste

- Reasons to filter
  - Potability (safety: lead, other contaminants)
    - NSF 53: “Health Effects”
  - Palatability (odor, taste, color)
    - NSF 42: “Aesthetic Effects”

- Cons of filtration
  - Cost
  - Timely replacement
  - Responsible disposal

NSF/ANSI Standard 42
Drinking Water Treatment Units - Aesthetic Effects

NSF/ANSI Standard 53
Drinking Water Treatment Units - Health Effects

Always use NSF-certified filters

Enabling drinking water

"Most tap water in CA is safe and meets high standards."

"Here are ways to minimize lead exposure."

- Understand the issues accurately

"Read your CCR."

"Here are reasons to reduce your SSB intake."

- Provide common sense solutions

- Be an informed voice

"Studies show a SSB tax is an effective fiscal strategy to improve health."

- Advocate for quality drinking water

"I will call my representative."

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Lead in Drinking Water: Next steps

Action Level

- Work towards consensus on a health-based AL for lead
  - But meanwhile, analyze samples to non-detect level
- Understand tradeoffs of a stricter Action Level for lead
  - Competing needs, relative risk, ability to accomplish remediation

Testing

- Need standardized, clear protocols for sampling … at which taps?
- Should testing be mandatory? Where? What exceptions?

Federal steps

- Require universal implementation of a national school drinking water lead test database
- Continued funding for testing and remediation is needed
  - HR 1729 - Water Affordability, Transparency, Equity and Reliability (WATER) Act of 2023-24*

HR 1729 California co-sponsors include Khanna, Huffman, Panetta, Vargas, Gomez, Matsui, Lee, Barragan, Jacobs, Mullin, Schiff, DeSaulnier, Lieu, Carbajal, Chu, Waters, Porter, Ruiz, Takano, Garcia

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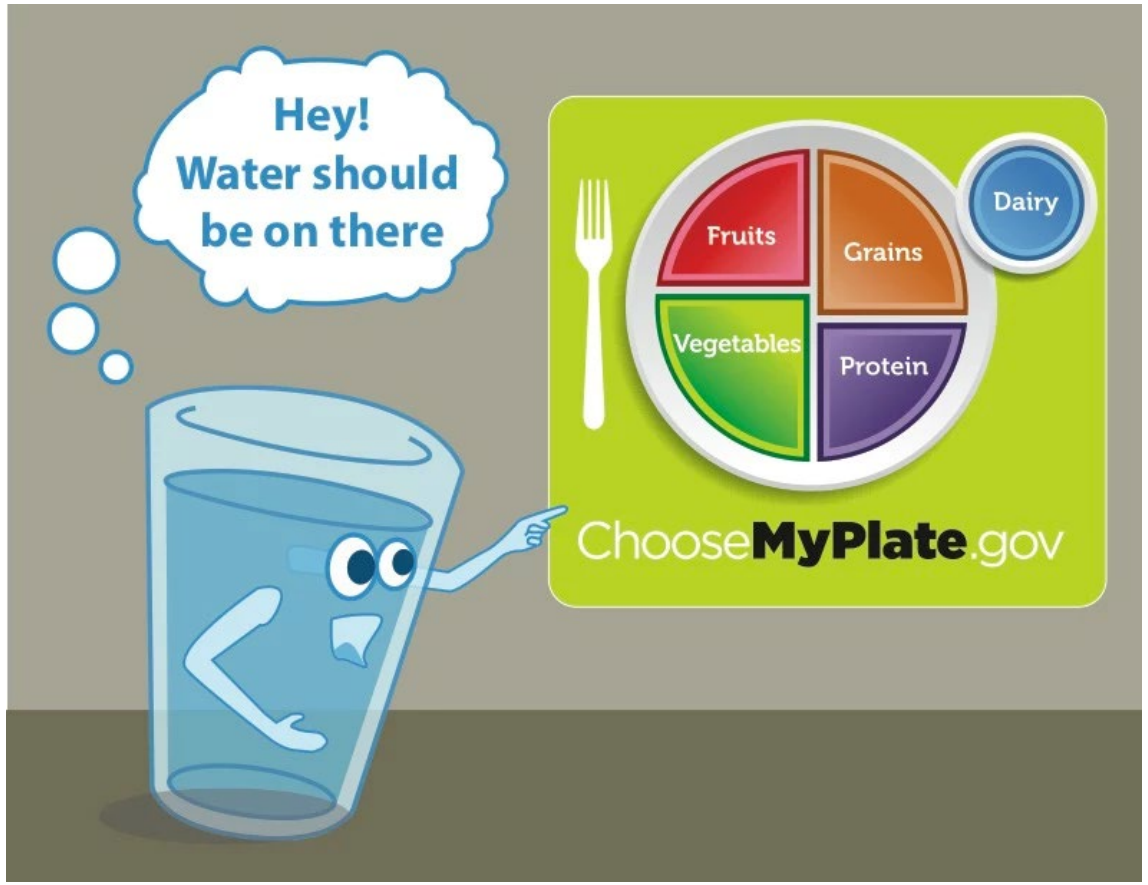
Current drinking water advocacy: Put water on MyPlate



Learn more at https://www.drinkingwateralliance.org/putwateronmyplate

Poster: L.A. County Department of Public Health

Thank you

Christina Hecht

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Q & A

QUESTIONS FOR YOU:

How to message health risks of elevated lead in water?

How to handle the “grey areas” around lower ppbs?

Where should the Action Level be set?

What do you hear from your community?

What other information would be helpful?

In what form?

Additional information

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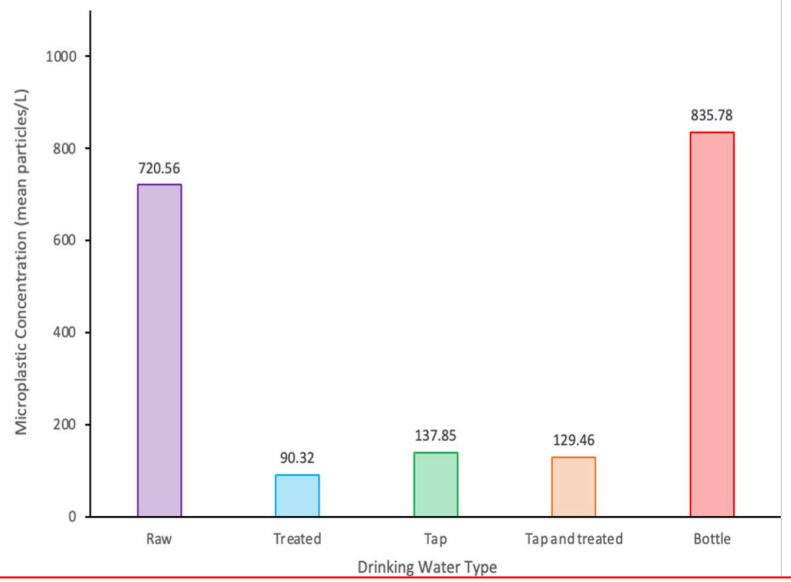
Recent UC research

Tap water paired with refillable stainless steel water bottles,
as **compared with** the average of all **other beverages** sold on a campus,
reduced

- **climate impact** by 95%
- **fresh water use** by 98%
- **plastic pollution** by 99%

– UC Santa Barbara campus lifecycle analysis
Meisterling et al., 2022



There is a **significant difference in microplastic concentrations between tap and bottled water.**

– Preliminary results
Nemati et al., unpublished

SB 1147 (proposed) – Microplastic Monitoring in Drinking and Bottled Water

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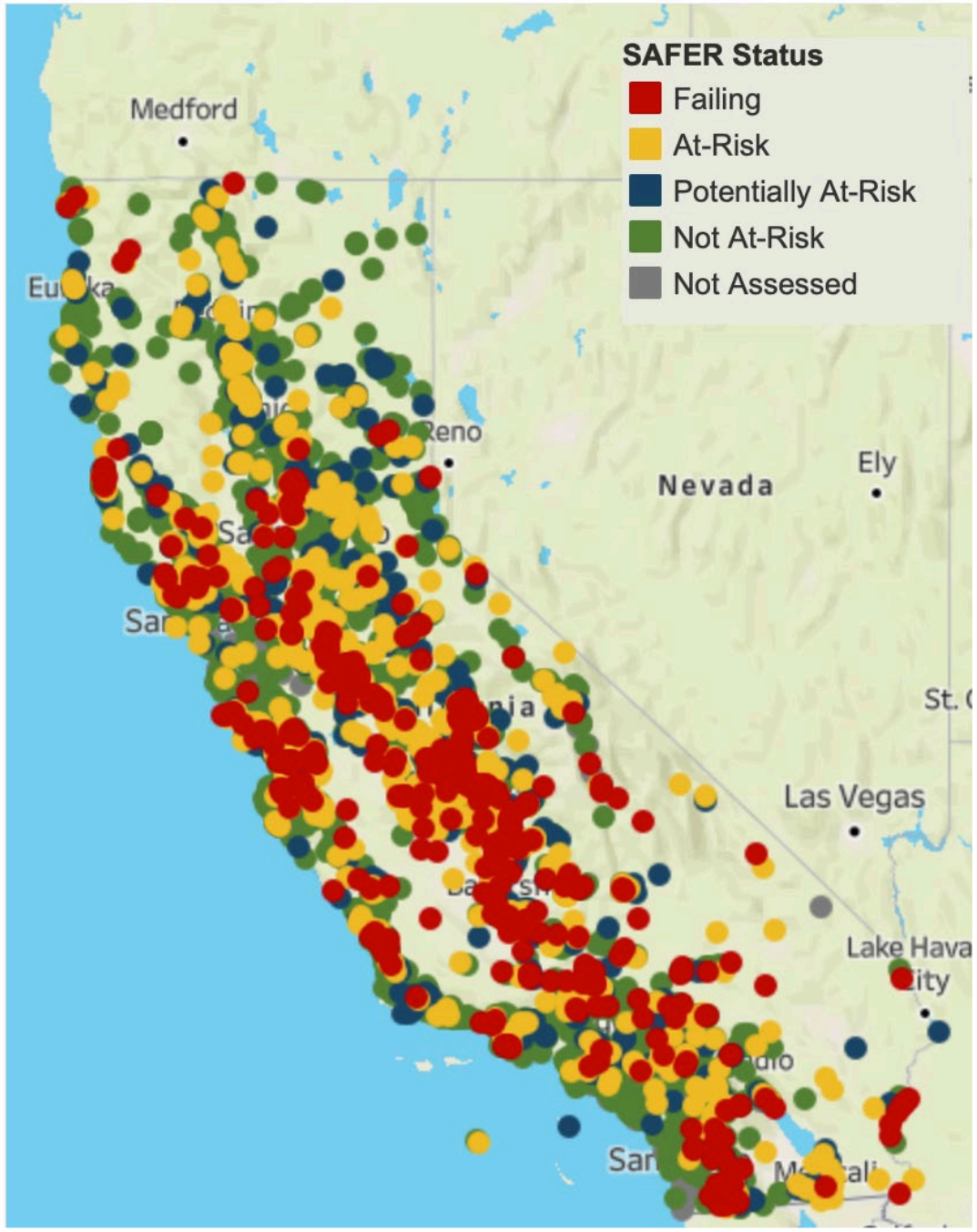

CA SAFER Program

(Safe and Affordable Funding for Equity and Resilience)

Assesses drinking water system

- Quality
- Accessibility
- Affordability

And,

- Utility capacity measures

California Water Boards | State Water Resources Control Board