Ice cream

Karen Pendergrass · Heavy Metal Index, Institute of Contaminant Standards

HEAVY METAL INDEX · INGREDIENT PROFILE October 2026
DOI 10.83376/hmi.ingredient.ice-cream

CITE AS

Pendergrass, K. (2026). Ice cream. Heavy Metal Index. https://doi.org/10.83376/hmi.ingredient.ice-cream

CORRESPONDENCE

Corrections are logged publicly on the article page, each with its date, the affected value, and the source that resolved it.

KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-10-22.

Abstract

Ice cream in the HMI library has 176 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Ba, Ga, Mo, Sr and Tl from 13 sources. WHO GEMS/Food submissions reported lead in ice cream as sold from 351 results in 3 reporting regions, with subgroup medians from 1.1 to 5.5 µg/kg. In the US Total Diet Study, ice cream as sold had a median lead result below 4 µg/kg across 3 composites from 2018-2020.

1 | Ice cream overview

Across 2 other studies of ordinary farms and markets, reported lead means and medians with the basis not stated ranged from 4.9 µg/kg (Dabeka et al. 1995) to 5.3 µg/kg (Dabeka et al. 1995).[7] For cadmium, 2 studies with the basis not stated reported means and medians from 0.31 µg/kg (Dabeka et al. 1995) to 3 µg/kg (Centre for Food Safety (Hong Kong) 2013).[7,8]

For a buyer the practical points are the form bought, the basis a result is reported on, where the ice cream came from and the laboratory's reporting limit. Testing finds contamination but does not remove it.

2 | What counts as ice cream

This page covers ice cream in 2 forms kept separate in every comparison: ice cream as sold (167 results) frozen and ice cream (9 results).[1,2,3,4,5,6]

Results stay on the basis each source reports: as sold or fresh weight, dry weight, or unstated. Dry-weight, as-sold and unstated results are never pooled, and no moisture conversion is applied.

3 | How metals reach ice cream

No study in the library compared ice cream from contaminated and ordinary settings, so the routes by which metals reach it are not measured here.

4 | Which forms and regions measured lower

The HMI reference for lead in ice cream as sold pools 109 subgroup units from 4 sampling families, with a median of below 5 µg/kg and a middle half spanning below 4 (lower quartile) and between 72 and 86 µg/kg (upper quartile).[1,2,3,4] frozen for lead in ice cream, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 26 units.[2] for cadmium in ice cream as sold, the reference median was below 1 µg/kg, with a middle half from below 1 to between 1.67 and 3 µg/kg across 116 units.[1,2,4]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed ice cream in the same study and group. Frozen ice cream (all samples) had lead lower at 2.1 µg/kg, against 3.4 µg/kg for the unprocessed form in the same group (ice cream as sold).[4]

Forms differ in water content, so a per-kilogram difference is not by itself a measured removal or gain of metal.

6 | Mitigation for ice cream

Lot testing against the applicable limit is the check that can be verified.

7 | Trade-offs and limits of controls

Metals do not move together, so a lot that passes a lead limit says little about cadmium, arsenic or nickel unless those are tested as well.

8 | Testing ice cream for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 3,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for cadmium ranged from 1 µg/kg (WHO GEMS/Food) to 1,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for total arsenic ranged from 3 µg/kg (FDA Total Diet Study) to 40 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,2]

A useful lot result names the form, the basis and a quantification limit well below the limit that applies.

9 | Buying and verifying ice cream

No maximum level for metals in ice cream was verified from primary text for this page; buyers should confirm the limit that applies in the destination market.

10 | Exposure from ice cream

No source in the library converted ice cream concentrations into a verified estimate of intake for a defined population. Concentrations describe the food, not individual risk.

11 | Evidence review and remaining gaps

Every source record that names ice cream was decided on its content: 13 occurrence extracted, 13 records in all. The occurrence table renders every extracted result; held values remain visible with their reason.

References identify the sources used in these answers. The Sources index preserves additional discovery links; inclusion there does not mean a source has been reviewed for this assessment. Corrections, completed searches, new direct evidence and changes in requirements should reopen the relevant answer.

12 | Ice cream FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Ba, Ga, Mo, Sr and Tl in ice cream, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in ice cream as sold from 351 results in 3 reporting regions, with subgroup medians from 1.1 to 5.5 µg/kg.[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same ice cream.[4] frozen ice cream (all samples) had lead lower at 2.1 µg/kg, against 3.4 µg/kg for the unprocessed form in the same group (ice cream as sold).[4]

Inorganic arsenic, the more toxic form, was measured in 6 results from 4 sources, far fewer than total arsenic.-[1,6,9,10] European Food Safety Authority (EFSA) 2014 reported inorganic arsenic at 4.2 µg/kg (mean) in ice cream as sold from European dietary-survey occurrence data.[10]

References

[1] GEMS/Food Contaminants database heavy-metal exports
World Health Organization · GEMS/Food Contamination Monitoring and Assessment Programme · 2026 · extranet.who.int
DATASET

[2] FY2018-FY2020 TDS Elements Analytical Results
U.S. Food and Drug Administration · FDA Total Diet Study · 2022 · www.fda.gov
DATASET

[3] ICP-MS-based determination of heavy metals and associated health risks in vegetables, ice creams, and wines in Slovenia
Rantaša M, Majer D, Godec L, Kolšek G, Erjavec E, and Finšgar M · International Journal of Environmental Analytical Chemistry 2026, 106(5), 1095-1114 · 2026 · doi.org/10.1080/03067319.2025.2534031
PEER-REVIEWED

[4] Infants' and young children's dietary exposures to lead and cadmium: FDA total diet study 2018-2020
Spungen JH and et al. · Food Additives & Contaminants: Part A · 2024 · doi.org/10.1080/19440049.2024.2396910
PEER-REVIEWED

[5] Lead Contamination in Selected Foods from Riyadh City Market and Estimation of the Daily Intake
Al Othman ZA · Molecules 2010, 15, 7482-7497 · 2010 · doi.org/10.3390/molecules15107482
PEER-REVIEWED

[6] Total Diet Study of metals and other elements in food
Baxter M and Brereton N · Food and Environment Research Agency report for the UK Food Standards Agency, Fera report 15/06, project FS102081 · 2015 · www.food.gov.uk
GOVERNMENT

[7] Survey of Lead, Cadmium, Fluoride, Nickel, and Cobalt in Food Composites and Estimation of Dietary Intakes of These Elements by Canadians in 1986-1988
Dabeka RW and McKenzie AD · Journal of AOAC International · 1995 · academic.oup.com
PEER-REVIEWED

[8] The First Hong Kong Total Diet Study: Metallic Contaminants
Centre for Food Safety (Hong Kong) · Centre for Food Safety, Food and Environmental Hygiene Department, Government of the Hong Kong Special Administrative Region · 2013 · www.cfs.gov.hk
GOVERNMENT

[9] The First Hong Kong Total Diet Study: Inorganic Arsenic
Centre for Food Safety FEHD HKSAR · Centre for Food Safety, Food and Environmental Hygiene Department, Government of the Hong Kong Special Administrative Region · 2012 · www.cfs.gov.hk
GOVERNMENT

[10] Dietary exposure to inorganic arsenic in the European population
European Food Safety Authority (EFSA) · EFSA Journal 2014;12(3):3597 · 2014 · doi.org/10.2903/j.efsa.2014.3597
GOVERNMENT

STATUS AND LICENCE

Editorially reviewed in-house; no external peer review has been completed on this ingredient profile. Published as an institutional technical report with its review state tracked on the article page. Released under CC BY 4.0.

DATA AVAILABILITY

Every source behind this ingredient profile is listed with its own source record at https://heavymetalindex.com/ingredients/ice-cream#sources.

COMPETING INTERESTS

The Heavy Metal Index reports what the peer-reviewed and regulatory literature supports. It is operated separately from any certification program, does not evaluate or endorse brands, and does not use certification thresholds as evidence for the statements made here.

PUBLICATION HISTORY

This revision 2026-10-22. The full dated record is maintained at https://heavymetalindex.com/ingredients/ice-cream.