Potatoes

Karen Pendergrass · Heavy Metal Index, Institute of Contaminant Standards

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Abstract

Potatoes in the HMI library has 1,314 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As, AsB, AsSug OH, AsSug PO4, AsSug SO3, AsSug SO4, Ba, Ca, Ga, Hg, I, K, Mg, Mo, P, Sr, Ti and Tl from 98 sources. WHO gems/food submissions reported lead in potatoes as sold from 7,594 results in 4 reporting regions, with subgroup medians from 1.4 to 110 µg/kg. In the US Total Diet Study, cooked potatoes had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Potatoes overview

Across 16 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 2 µg/kg (ANSES 2026) to 1,500 µg/kg (Islam et al. 2015).[5,8] For cadmium, 20 studies on an as-sold or fresh-weight basis reported means and medians from 2.2 µg/kg (Sixto et al. 2023) to 452 µg/kg (Chowdhury et al. 2024).[9,10] Higher results came from contaminated or exposed settings rather than ordinary supply. Potatoes as sold from private garden (industrial-affected area) had lead higher at 58.8 µg/kg, against 18.5 µg/kg for private garden in the same study.[7]

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

2 | What counts as potatoes

This page covers potatoes in 7 forms kept separate in every comparison: potatoes as sold (1,141 results), peeled or flesh potatoes (66 results), cooked potatoes (58 results), potatoes flour or meal (24 results), dried potatoes (16 results), potatoes powder or ground (6 results) canned and potatoes (3 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 potatoes

The evidence on how metals reach potatoes comes from studies that compared exposed and ordinary settings. Potatoes as sold from private garden (industrial-affected area) had lead higher at 58.8 µg/kg, against 18.5 µg/kg for private garden in the same study.[7] In another study, potatoes as sold from Cu100Zn100Pb100 (experiment) had Zn higher at 9,600 µg/kg, against 3,600 µg/kg for control plot, no metal addition, no fertilizer in the same study.[30]

These are observational comparisons from single studies; the size of the difference depends on the site, metal and distance.

4 | Which forms and regions measured lower

The hmi reference for lead in potatoes as sold pools 169 subgroup units from 4 sampling families, with a median of 130 µg/kg and a middle half spanning below 6 (lower quartile) and 408 µg/kg (upper quartile).[1,9,25,31] for lead in potatoes as sold, the reference median was between 150 and 200 µg/kg, with a middle half from below 10 to 2,150 µg/kg across 7 units.[1,32,33,34] cooked for lead in potatoes, the reference median was below 4 µg/kg, with a middle half from below 4 to below 8 µg/kg across 29 units.[2,35,36]

Among GEMS/Food reporting regions, potatoes as sold had the lowest lead subgroup median in PAHO (1.4 µg/kg) and the highest in WPRO (110 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (4 µg/kg) and the highest in EURO (133 µg/kg).[1] For total arsenic, the lowest regional median was in EURO (0.613 µg/kg) and the highest in EURO (25.4 µg/kg).[1]

Targeted potatoes as sold samples in WPRO had cadmium lower at 22.6 µg/kg, against 30.8 µg/kg for WPRO in the same study.[1] In another study, targeted potatoes as sold samples in WPRO had cadmium higher at 110 µg/kg, against 30.8 µg/kg for WPRO in the same study.[1]

In one study, lead across 20 groups of potatoes ranged from 21 µg/kg (US baby-food manufacturer D, ingredient lot, test date 2018) to 55.3 µg/kg (US baby-food manufacturer B, ingredient lot, test date 11/2/2018); the lowest is the lowest observed in that study, not an established sourcing preference.[37] In another study, lead across 4 groups of potatoes ranged from 13.2 µg/kg (amateur farmers; washed with 5% acetic acid vinegar) to 63.5 µg/kg (vegetable and fruit market; washed with 5% acetic acid vinegar); the lowest is the lowest observed in that study, not an established sourcing preference.[38]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed potatoes in the same study and group. Peeled or flesh potatoes (Starchy roots and potatoes) had lead lower at 0 µg/kg, against 3 µg/kg for the unprocessed form in the same group (potatoes as sold).[39] In another study, cooked potatoes (5 city composites) had lead lower at 6.7 µg/kg, against 10.1 µg/kg for the unprocessed form in the same group (potatoes as sold).[40] canned a third study found that potatoes (Vegetables, Riyadh city markets, May 2009) had lead higher at 41 µg/kg, against 3 µg/kg for the unprocessed form in the same group (potatoes as sold).[41]

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

6 | Mitigation for potatoes

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

7 | Trade-offs and limits of controls

Avoiding exposed growing areas lowered the metal measured in the studies available, but no study measured the cost or supply effect of doing so.[7] 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 potatoes for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 0.08 µg/kg (Iyu 2022) to 3,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,42] Reporting limits for cadmium ranged from 0.04 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 0.088 µg/kg (WHO GEMS/Food) to 40,400 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1]

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

9 | Buying and verifying potatoes

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

10 | Exposure from potatoes

No source in the library converted potatoes 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 potatoes was decided on its content: 98 occurrence extracted, 98 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 | Potatoes FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As, AsB, AsSug OH, AsSug PO4, AsSug SO3, AsSug SO4, Ba, Ca, Ga, Hg, I, K, Mg, Mo, P, Sr, Ti and Tl in potatoes, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in potatoes as sold from 7,594 results in 4 reporting regions, with subgroup medians from 1.4 to 110 µg/kg.[1]

In the studies available, potatoes from contaminated or exposed settings carried more metal than potatoes from the same study's control.[7] potatoes as sold from private garden (industrial-affected area) had lead higher at 23.5 µg/kg, against 18.5 µg/kg for private garden in the same study.[7]

Among GEMS/Food reporting regions, potatoes as sold had the lowest lead subgroup median in PAHO (1.4 µg/kg) and the highest in WPRO (110 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (4 µg/kg) and the highest in EURO (133 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same potatoes.[39] peeled or flesh potatoes (Starchy roots and potatoes) had lead lower at 0 µg/kg, against 3 µg/kg for the unprocessed form in the same group (potatoes as sold).[39]

Inorganic arsenic, the more toxic form, was measured in 17 results from 7 sources, far fewer than total arsenic.[1,11,43,44,45,12,46] Across 2 other studies of ordinary farms and markets, reported inorganic arsenic means and medians on an as-sold or fresh-weight basis ranged from 1.3 µg/kg (Marín et al. 2018) to 700 µg/kg (Laizu 2007).[43,44]

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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.

DATA AVAILABILITY

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

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