Walnuts

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Abstract

Walnuts in the HMI library has 219 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, Se, Ag, B, Ba, Ca, Mg, Mo and Tl from 16 sources. WHO gems/food submissions reported lead in walnuts as sold from 352 results in 3 reporting regions, with a subgroup median of 325 µg/kg. In the US Total Diet Study, walnuts as sold had a median lead result below 4 µg/kg across 22 composites from 2017-2020.

1 | Walnuts overview

Across 2 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 2.2 µg/kg (Spungen et al. 2024) to 59 µg/kg (Matei et al. 2025).[4,5] For cadmium, 2 studies on an as-sold or fresh-weight basis reported means and medians from 0.6 µg/kg (Spungen et al. 2024) to 5 µg/kg (Matei et al. 2025).[4,5] Higher results came from contaminated or exposed settings rather than ordinary supply. Walnuts oil from organic farming, sample OWO1 had Mg higher at 11,700 µg/kg, against 1,500 µg/kg for conventional farming, sample CWO1 in the same study.[3]

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

2 | What counts as walnuts

This page covers walnuts in 3 forms kept separate in every comparison: walnuts oil (109 results), walnuts as sold (80 results) peeled or flesh and walnuts (30 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 walnuts

The evidence on how metals reach walnuts comes from studies that compared exposed and ordinary settings. Walnuts oil from organic farming, sample OWO1 had Mg higher at 11,700 µg/kg, against 1,500 µg/kg for conventional farming, sample CWO1 in the same study.[3]

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 walnuts as sold pools 52 subgroup units from 2 sampling families, with a median of below 4 µg/kg and a middle half spanning below 4 (lower quartile) and below 39.5 µg/kg (upper quartile).[1,2] for cadmium in walnuts as sold, the reference median was below 1 µg/kg, with a middle half from below 1 to between 1 and 8 µg/kg across 55 units.[1,2] for cadmium in walnuts as sold, the reference median was below 10 µg/kg, with a middle half from below 10 to below 10 µg/kg across 4 units.[1]

Among GEMS/Food reporting regions, walnuts as sold had the lowest cadmium subgroup median in WPRO (5 µg/kg) and the highest in EMRO (22.7 µg/kg); reporting regions are markets, not growing areas.[1] For total mercury, the lowest regional median was in WPRO (10 µg/kg) and the highest in EURO (50 µg/kg).[1]

5 | Processing, cooking and preparation

No processing study for metals in this food is in the library yet.

6 | Mitigation for walnuts

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.[3] 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 walnuts for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 3 µg/kg (WHO GEMS/Food) to 2,430 µg/kg (Manousi et al. 2021), so a non-detect from a less sensitive method says much less.[1,3] Reporting limits for cadmium ranged from 0.5 µg/kg (WHO GEMS/Food) to 1,530 µg/kg (Manousi et al.

2021), so a non-detect from a less sensitive method says much less.[1,3] Reporting limits for total arsenic ranged from 3 µg/kg (FDA Total Diet Study) to 200 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 walnuts

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

10 | Exposure from walnuts

No source in the library converted walnuts 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 walnuts was decided on its content: 16 occurrence extracted, 16 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 | Walnuts FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, Se, Ag, B, Ba, Ca, Mg, Mo and Tl in walnuts, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in walnuts as sold from 352 results in 3 reporting regions, with a subgroup median of 325 µg/kg.[1]

In the studies available, walnuts from contaminated or exposed settings carried more metal than walnuts from the same study's control.[3] walnuts oil from conventional farming, sample CWO1 had Fe higher at 13,800 µg/kg, against 5,500 µg/kg for conventional farming, sample CWO2 in the same study.[3]

Among GEMS/Food reporting regions, walnuts as sold had the lowest cadmium subgroup median in WPRO (5 µg/kg) and the highest in EMRO (22.7 µg/kg); reporting regions are markets, not growing areas.[1] For total mercury, the lowest regional median was in WPRO (10 µg/kg) and the highest in EURO (50 µg/kg).[1]

Inorganic arsenic, the more toxic form, was measured in 1 result from 1 source, far fewer than total arsenic.[7] European Food Safety Authority (EFSA) 2014 reported inorganic arsenic at 14.8 µg/kg (mean) in walnuts as sold from European dietary-survey occurrence data.[7]

References

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PEER-REVIEWED

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GOVERNMENT

STATUS AND LICENCE

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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/walnuts#sources.

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