Peanuts

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Abstract

Peanuts in the HMI library has 638 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ca, K, Mg, Mo, Na, P and Sr from 27 sources. WHO gems/food submissions reported lead in peanuts as sold from 916 results in 5 reporting regions, with subgroup medians from 1.4 to 500 µg/kg. In the US Total Diet Study, cooked peanuts had a median lead result below 4 µg/kg across 3 composites from 2018-2020.

1 | Peanuts 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 0.2 µg/kg (Ibanga et al. 2019) to 60 µg/kg (Chen et al. 2022).[3,7] For cadmium, 2 studies on an as-sold or fresh-weight basis reported means and medians from 41 µg/kg (Spungen et al. 2024) to 204 µg/kg (Chen et al. 2022).[3,8]

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

2 | What counts as peanuts

This page covers peanuts in 3 forms kept separate in every comparison: peanuts as sold (618 results), cooked peanuts (16 results) and peanuts oil (4 results).[1,2,3,4,5,6] Foods made from peanuts that have their own pages, such as peanut butter and peanut oil, are covered there.

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 peanuts

No study in the library compared peanuts 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 peanuts as sold pools 80 subgroup units from 3 sampling families, with a median of below 20 µg/kg and a middle half spanning below 3 (lower quartile) and below 100 µg/kg (upper quartile).[1,3,4] cooked for lead in peanuts, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 4 units.[2,8] for cadmium in peanuts as sold, the reference median was below 30 µg/kg, with a middle half from below 30 to 45 µg/kg across 72 units.[1,4]

Among GEMS/Food reporting regions, peanuts as sold had the lowest lead subgroup median in PAHO (1.4 µg/kg) and the highest in WPRO (500 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in AFRO (11 µg/kg) and the highest in EURO (122 µg/kg).[1]

Targeted peanuts as sold samples in EURO had cadmium lower at 24 µg/kg, against 47 µg/kg for EURO in the same study.[1] In another study, targeted peanuts as sold samples in EURO had cadmium lower at 16 µg/kg, against 47 µg/kg for EURO in the same study.[1]

In one study, lead across 6 groups of peanuts ranged from 10 µg/kg (peanut shop sample P1, Jigjiga market) to 40 µg/kg (peanut shop sample P5, Jigjiga market); the lowest is the lowest observed in that study, not an established sourcing preference.[10] In another study, lead across 5 groups of peanuts ranged from 7 µg/kg (Guangdong Province) to 60 µg/kg (Liaoning Province); the lowest is the lowest observed in that study, not an established sourcing preference.[3]

5 | Processing, cooking and preparation

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

6 | Mitigation for peanuts

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

Shao et al. (2022) tested foliar selenium spraying combined with biochar in a greenhouse pot experiment using two peanut cultivars (Huayu 23, Huayu 20) grown in cadmium-spiked soil (5 and 20 mg/kg). This is an intervention study under artificial cadmium contamination; grain cadmium values are not representative of market conditions. Cadmium was the only metal measured.[14]

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 peanuts for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 4,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1]

Reporting limits for cadmium ranged from 0.1 µg/kg (Chen et al. 2022) to 200 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,3] Reporting limits for total arsenic ranged from 0.4 µg/kg (Hovanec 2004) to 250 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,11]

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

9 | Buying and verifying peanuts

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

10 | Exposure from peanuts

No source in the library converted peanuts 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 peanuts was decided on its content: 27 occurrence extracted, 27 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 | Peanuts FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ca, K, Mg, Mo, Na, P and Sr in peanuts, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in peanuts as sold from 916 results in 5 reporting regions, with subgroup medians from 1.4 to 500 µg/kg.[1]

Among GEMS/Food reporting regions, peanuts as sold had the lowest lead subgroup median in PAHO (1.4 µg/kg) and the highest in WPRO (500 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in AFRO (11 µg/kg) and the highest in EURO (122 µg/kg).[1]

Inorganic arsenic, the more toxic form, was measured in 6 results from 3 sources, far fewer than total arsenic.[1,12,13] Across 2 other studies of ordinary farms and markets, reported inorganic arsenic means and medians with the basis not stated ranged from 6 µg/kg (Centre for Food Safety FEHD HKSAR 2012) to 18 µg/kg (European Food Safety Authority (EFSA) 2014).[12,13]

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] Determination of macro, micro and toxic element concentrations in peanuts from main peanut producing areas of China by ICP-MS: a pilot study on the geographical characterization
Chen L, Ding M, Li Z, Li X, and Deng L · RSC Advances · 2022 · doi.org/10.1039/d2ra02148j
PEER-REVIEWED

[4] Evaluation of honeys and bee products quality based on their mineral composition using multivariate techniques
Grembecka M and Szefer P · Environmental Monitoring and Assessment 185:4033-4047 · 2013 · doi.org/10.1007/s10661-012-2847-y
PEER-REVIEWED

[5] Assessment of natural radioactivity and heavy metal accumulation in selected edible fruit nuts from Lagos and Ogun State markets, Nigeria
Alatise OO, Aluko TO, and Okoye OJ · Nigerian Journal of Theoretical and Environmental Physics · 2025 · doi.org/10.62292/njtep.v3i2.2025.93
PEER-REVIEWED

[6] Characterization of Heavy Metals in Some Edible Dried Fruits and Nuts Using Inductively Coupled Plasma Optical Emission Spectroscopy
Akçay Kulluk D, Gökmen F, Dursun N, Özcan MM, and Lemiashonak V · Erwerbs-Obstbau (Springer); accepted 26 November 2022; volume and pages not printed in the filed PDF · 2023 · doi.org/10.1007/s10341-022-00815-2
PEER-REVIEWED

[7] Studies on chemical elements and anti-nutrients compositions of three traditional vegetable oils in Nigeria
Ibanga UI, Fakunle JO, Raji AO, and Sogunle KA · Journal of Agricultural Science and Practice 4(5), 144-150 · 2019 · doi.org/10.31248/jasp2019.155
PEER-REVIEWED

[8] 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

[9] Risk assessment of heavy metals concentration in cereals and legumes sold in the Tamale Aboabo market, Ghana
Adam AA, Sackey LNA, and Ofori LA · Heliyon 8 (2022) e10162 · 2022 · doi.org/10.1016/j.heliyon.2022.e10162
PEER-REVIEWED

[10] Heavy metals concentration and health risk assessment in peanut and date palm from Jigjiga City Markets, Ethiopia
Belew AA, Besha AT, Assege MA, and Moges GW · Discover Environment · 2024 · doi.org/10.1007/s44274-024-00151-0
PEER-REVIEWED

[11] Arsenic speciation in commercially available peanut butter spread by IC-ICP-MS
Hovanec BM · Journal of Analytical Atomic Spectrometry · 2004 · doi.org/10.1039/b402561j
PEER-REVIEWED

[12] 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

[13] 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

[14] Foliar Spraying of Selenium Combined with Biochar Alleviates Cadmium Toxicity in Peanuts and Enriches Selenium in Peanut Grains
Shao S, Ma B, Ai L, Tian X, and Zhang L · International Journal of Environmental Research and Public Health · 2022 · doi.org/10.3390/ijerph19063542
PEER-REVIEWED

STATUS AND LICENCE

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DATA AVAILABILITY

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

COMPETING INTERESTS

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