Cauliflower

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Abstract

Cauliflower in the HMI library has 343 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, Ba, Ca, K, Mg, Mo, P, Sr, Ti and Tl from 29 sources. WHO gems/food submissions reported lead in cauliflower as sold from 1,037 results in 4 reporting regions, with a subgroup median of 5.42 µg/kg. In the US Total Diet Study, cooked cauliflower had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Cauliflower overview

Across 3 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 4.4 µg/kg (Norton et al. 2015) to 12,200 µg/kg (Chowdhury et al. 2024).[3,6] For cadmium, 5 studies on an as-sold or fresh-weight basis reported means and medians from 3.4 µg/kg (Norton et al. 2015) to 1,720 µg/kg (Chowdhury et al. 2024).[3,6]

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

2 | What counts as cauliflower

This page covers cauliflower in 2 forms kept separate in every comparison: cauliflower as sold (334 results) cooked and cauliflower (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 cauliflower

Root uptake from soil is the primary documented pathway for cadmium in Brassicaceae crops including cauliflower. A controlled greenhouse experiment in turkey grew broccoli (*Brassica oleracea* var. *italica*) and white cabbage (*Brassica oleracea* var. *capitata*) alongside cress and watercress in soil spiked with cadmium at five levels (0 to 50 mg per kg soil as CdCl2) and characterized cadmium uptake, root-to-shoot translocation, and nutrient disruption across the four species.17 White cabbage, which is the most closely related species tested to cauliflower, accumulated the highest absolute shoot cadmium at the highest soil treatment level (251.6 mg per kg dry weight at 50 mg Cd per kg soil), and exhibited particularly poor root retention at low soil cadmium concentrations (5 mg per kg), where shoot cadmium distribution increased nearly sixfold relative to the control.17 The study highlighted that visible agronomic tolerance does not protect against cadmium accumulation in edible tissues, which is relevant to Brassicaceae crops broadly, including cauliflower.17

These values are from a greenhouse spiked-soil experiment on a dry weight basis at cadmium concentrations substantially above typical agricultural background levels (background 0.1 to 0.5 mg per kg soil; slightly contaminated soils approximately 1 to 3 mg per kg). No dedicated retail cauliflower was tested in this deposit; the mechanistic pathway evidence applies to Brassicaceae broadly.

Organic soil amendments and wastewater irrigation are a separate documented pathway. A field trial in Zomba, Malawi applied bio-slurry (derived from municipal wastewater treatment) to plots growing rape (*Brassica napus*) and Chinese cabbage (*Brassica pekinensis*) and measured no detectable lead or mercury in crop samples; cadmium in crops remained below FAO/WHO permissible limits in all amendment treatments, though soil chromium concentrations rose under bio-slurry application.18

Wastewater irrigation in a peri-urban Malawian setting produced lead exceedances above FAO/WHO permissible limits in all Brassica species sampled, with the highest concentrations in Brassica rapa stems (lead 4.09 mg per kg dry weight, against a permissible limit of 0.3 mg per kg). Cadmium and total chromium concentrations also partially exceeded permissible limits in several Brassica species under wastewater irrigation.19 Those measurements were on a dry weight basis from a single-season snapshot at a wastewater treatment plant irrigation site and do not characterize commercial cauliflower supply chains.

4 | Which forms and regions measured lower

For cadmium, the HMI cooked reference median was lowest for cauliflower (11 µg/kg) and highest for cauliflower as sold (99 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[2,8,9,10,11] The hmi reference for lead in cauliflower as sold pools 7 subgroup units from 4 sampling families, with a median of 1,310 µg/kg and a middle half spanning between 57.9 and 62.9 (lower quartile) and 3,330 µg/kg (upper quartile).[8,9,10,11] cooked for lead in cauliflower, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 28 units.[2,12] for lead in cauliflower as sold, the reference median was below 7 µg/kg, with a middle half from below 5.65 to below 14.3 µg/kg across 52 units.[1]

Among GEMS/Food reporting regions, cauliflower as sold had the lowest cadmium subgroup median in EURO (4.2 µg/kg) and the highest in PAHO (9.5 µg/kg); reporting regions are markets, not growing areas.[1]

Targeted cauliflower as sold samples in EURO had aluminum lower at 280 µg/kg, against 679 µg/kg for EURO in the same study.[1]

In one study, lead across 5 groups of cauliflower ranged from 40 µg/kg (locality V (green markets, Novi Sad)) to 5,670 µg/kg (locality I (green markets, Novi Sad)); the lowest is the lowest observed in that study, not an established sourcing preference.[8] In another study, lead across 4 groups of cauliflower ranged from 2,500 µg/kg

(Nelamangala taluk market, Bangalore Rural) to 7,530 µg/kg (Hosakote taluk market, Bangalore Rural); the lowest is the lowest observed in that study, not an established sourcing preference.[10]

5 | Processing, cooking and preparation

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

6 | Mitigation for cauliflower

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 cauliflower for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 0.83 µg/kg (Altıkulaç e t al. 2025) to 3,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much l ess.[1,13] Reporting limits for cadmium ranged from 0.5 µg/kg (WHO GEMS/Food) to 50 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 0.4 µg/kg (Liang et al. 2019) to 500 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,14]

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

9 | Buying and verifying cauliflower

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

10 | Exposure from cauliflower

No source in the library converted cauliflower 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 cauliflower was decided on its content: 29 occurrence extracted, 29 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 | Cauliflower 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, Ba, Ca, K, Mg, Mo, P, Sr, Ti and Tl in cauliflower, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in cauliflower as sold from 1,037 results in 4 reporting regions, with a subgroup median of 5.42 µg/kg.[1]

For cadmium, the HMI cooked reference median was lowest for cauliflower (11 µg/kg) and highest for cauliflower as sold (99 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[2,8,9,10,11]

Among GEMS/Food reporting regions, cauliflower as sold had the lowest cadmium subgroup median in EURO (4.2 µg/kg) and the highest in PAHO (9.5 µg/kg); reporting regions are markets, not growing areas.[1]

Inorganic arsenic, the more toxic form, was measured in 6 results from 3 sources, far fewer than total arsenic.-[1,15,16] Laizu 2007 reported inorganic arsenic at 400 µg/kg (mean ± 500 SD) in cauliflower as sold from fruiting vegetables, local market, Dhaka.[15]

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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/cauliflower#sources.

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