Shrimp

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Abstract

Shrimp in the HMI library has 685 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, methylmercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, As, As(III), As(V), AsB, AsC, AsIII, AsSugar-OH, AsSugar-PO4, AsSugar-SO3, AsSugar-SO4, AsV, Cr(III), CrVI, DBT, DOT, DPhT, Hg, Hg-inorganic, I, MBT, Mo, MPhT, oAs, organotin_DBT, organotin_DPT, organotin_MBT, organotin_MPT, organotin_TBT, organotin_TPT, OTC_sum_as_Sn, Rb, Sr, sumBT, sumOTC, sumPhT, TBT, TBT+DBT+TPhT, TMA, TPhT, TPT and unknown As from 49 sources. WHO gems/food submissions reported lead in shrimp as sold from 3,663 results in 3 reporting regions, with subgroup medians from 5.77 to 121 µg/kg. In the US Total Diet Study, cooked shrimp had a median lead result of 4.2 µg/kg across 27 composites from 2017-2020.

1 | Shrimp overview

Across 9 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 5.8 µg/kg (Spungen et al. 2024) to 9,470 µg/kg (Baki et al. 2018).[4,8] For cadmium, 10 studies on an as-sold or fresh-weight basis reported means and medians from 1 µg/kg (Olmedo et al. 2013) to 30,400 µg/kg (Baki et al. 2018).[4,9] Higher results came from contaminated or exposed settings rather than ordinary supply. Shrimp as sold from water-soluble had dimethylarsinic acid higher at 470 µg/kg, against 10 µg/kg for lipid-soluble in the same study.[7]

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

2 | What counts as shrimp

This page covers shrimp in 7 forms kept separate in every comparison: shrimp as sold (633 results), dried shrimp (25 results), cooked shrimp (14 results), shrimp powder or ground (4 results), canned shrimp (3 results), frozen shrimp (3 results) peeled or flesh and shrimp (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 shrimp

The evidence on how metals reach shrimp comes from studies that compared exposed and ordinary settings. Shrimp as sold from water-soluble had dimethylarsinic acid higher at 470 µg/kg, against 10 µg/kg for lipid-soluble in the same study.[7] In another study, frozen shrimp from frozen product (moisture 82%) had inorganic arsenic higher at 396 µg/kg, against 384 µg/kg for frozen product (moisture 82%) in the same study.[13]

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

For lead, the HMI cooked reference median was lowest for shrimp (4.2 µg/kg) and highest for shrimp as sold (33 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,9] The hmi reference for lead in shrimp as sold pools 66 subgroup units from 2 sampling families, with a median of 33 µg/kg and a middle half spanning below 15 (lower quartile) and 33 µg/kg (upper quartile).[1,9] cooked for lead in shrimp, the reference median was 4.2 µg/kg, with a middle half from below 4 to 8 µg/kg across 27 units.[2] for cadmium in shrimp as sold, the reference median was 10 µg/kg, with a middle half from between 1 and 2 to 29 µg/kg across 105 units.[1,9]

Among GEMS/Food reporting regions, shrimp as sold had the lowest lead subgroup median in WPRO (5.77 µg/kg) and the highest in WPRO (121 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (5 µg/kg) and the highest in EURO (500 µg/kg).[1] For total arsenic, the lowest regional median was in PAHO (155 µg/kg) and the highest in EURO (2,290 µg/kg).[1]

Targeted shrimp as sold samples in WPRO had cadmium lower at 21.5 µg/kg, against 25.5 µg/kg for WPRO in the same study.[1] In another study, targeted shrimp as sold samples in WPRO had cadmium lower at 7.28 µg/kg, against 25.5 µg/kg for WPRO in the same study.[1]

In one study, lead across 14 groups of shrimp ranged from 72 µg/kg (Kafr El-Sheikh fish market, summer 2020) to 534 µg/kg (Damietta fish market, winter 2019); the lowest is the lowest observed in that study, not an established sourcing preference.[14] In another study, lead across 8 groups of shrimp ranged from 467 µg/kg (female, Karatas (Station 3)) to 708 µg/kg (male, Karatas (Station 3)); 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 shrimp

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 shrimp 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 0.158 µg/kg (Olmedo et al. 2013) to 1,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,9] 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.[1,15]

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

9 | Buying and verifying shrimp

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

10 | Exposure from shrimp

No source in the library converted shrimp 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 shrimp was decided on its content: 49 occurrence extracted, 49 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 | Shrimp FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, monomethylarsonic acid, total mercury, methylmercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, As, As(III), As(V), AsB, AsC, AsIII, AsSugar-OH, AsSugar-PO4, AsSugar-SO3, AsSugar-SO4, AsV, Cr(III), CrVI, DBT, DOT, DPhT, Hg, Hg-inorganic, I, MBT, Mo, MPhT, oAs, organotin_DBT, organotin_DPT, organotin_MBT, organotin_MPT, organotin_TBT, organotin_TPT, OTC_sum_as_Sn, Rb, Sr, sumBT, sumOTC, sumPhT, TBT, TBT+DBT+TPhT, TMA, TPhT, TPT and unknown As in shrimp, most often lead, cadmium and total

arsenic.[1,2,3,4] WHO gems/food submissions reported lead in shrimp as sold from 3,663 results in 3 reporting regions, with subgroup medians from 5.77 to 121 µg/kg.[1]

In the studies available, shrimp from contaminated or exposed settings carried more metal than shrimp from the same study's control.[7] shrimp as sold from Muscle had total arsenic higher at 65,800 µg/kg, against 13,600 µg/kg for Muscle in the same study.[7]

For lead, the HMI cooked reference median was lowest for shrimp (4.2 µg/kg) and highest for shrimp as sold (33 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,9]

Among GEMS/Food reporting regions, shrimp as sold had the lowest lead subgroup median in WPRO (5.77 µg/kg) and the highest in WPRO (121 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (5 µg/kg) and the highest in EURO (500 µg/kg).[1]

Inorganic arsenic, the more toxic form, was measured in 29 results from 11 sources, far fewer than total arsenic.[1,7,16,17,18,19,20,21,22,13,23] Across 2 other studies of ordinary farms and markets, reported inorganic arsenic means and medians with the basis not stated ranged from 22 µg/kg (European Food Safety Authority (EFSA) 2014) to 36.2 µg/kg (European Food Safety Authority (EFSA) 2014).[19]

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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/shrimp#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.

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