# Canned Tuna

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## Abstract

Canned tuna in the HMI library has 1,099 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, methylmercury, inorganic mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As, Ba, Be, Ca, Hg-inorganic, Mo, Sr and Ti from 45 sources. WHO GEMS/Food submissions reported lead in canned tuna as sold from 1,077 results in 3 reporting regions, with subgroup medians below 12 µg/kg, mostly non-detects. canned in the us total diet study canned tuna had a median lead result below 4 µg/kg across 3 composites from 2018-2020.

## 1 | Canned tuna 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 3 µg/kg (Ulusoy 2023) to 830 µg/kg (Ulusoy 2023).[8] For cadmium, 11 studies on an as-sold or fresh-weight basis reported means and medians from 1 µg/kg (Kosker et al. 2023) to 246 µg/kg (Korfali et al. 2013).[9,10] Higher results came from contaminated or exposed settings rather than ordinary supply. Canned tuna from sauce-packed had total mercury higher at 380 µg/kg, against 153 µg/kg for water-packed in the same study.[7]

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

## 2 | What counts as canned tuna

This page covers canned tuna in 5 forms kept separate in every comparison: canned tuna (764 results), canned tuna oil (270 results), canned tuna as sold (63 results), frozen canned tuna (1 result) peeled or flesh and canned tuna (1 result).[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 canned tuna

The evidence on how metals reach canned tuna comes from studies that compared exposed and ordinary settings. Canned tuna from sauce-packed had total mercury higher at 380 µg/kg, against 153 µg/kg for water-packed in the same study.[7] canned in another study canned tuna from packing-medium summary had total mercury higher at 227 µg/kg, against 188 µg/kg for all samples (summary mean) in the same study.[19]

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 cadmium, the HMI reference median was lowest for canned tuna as sold (8 µg/kg) and highest for canned tuna (21 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,5,6,20] The HMI reference for lead in canned tuna pools 11 subgroup units from 6 sampling families, with a median of below 7 µg/kg and a middle half spanning below 4 (lower quartile) and 180 µg/kg (upper quartile).[2,5,6,12,21,22] for lead in canned tuna as sold, the reference median was below 4.67 µg/kg, with a middle half from below 4.35 to below 10 µg/kg across 16 units.[1,20] for lead in canned tuna oil, the reference median was below 3.05 µg/kg, with a middle half from below 1 to below 5.1 µg/kg across 11 units.[4,12]

Canned among gems/food reporting regions tuna as sold had the lowest cadmium subgroup median in EURO (9 µg/kg) and the highest in WPRO (11.8 µg/kg); reporting regions are markets, not growing areas.[1] For total mercury, the lowest regional median was in WPRO (45 µg/kg) and the highest in WPRO (170 µg/kg).[1]

Targeted canned tuna as sold samples in EURO had cadmium higher at 2,760 µg/kg, against 9 µg/kg for EURO in the same study.[1] In another study, targeted canned tuna as sold samples in WPRO had cadmium higher at 15 µg/kg, against 11.8 µg/kg for WPRO in the same study.[1]

In one study, lead across 35 groups of canned tuna ranged from 3 µg/kg (purchased in Denmark) to 830 µg/kg (purchased in Russia); the lowest is the lowest observed in that study, not an established sourcing preference.[8] In another study, lead across 17 groups of canned tuna ranged from 150 µg/kg (product MI1) to 430 µg/kg (product P-1); the lowest is the lowest observed in that study, not an established sourcing preference.[9]

## 5 | Processing, cooking and preparation

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

## 6 | Mitigation for canned tuna

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 canned tuna for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 0.1 µg/kg (Anwar et al. 2021) to 30 µg/kg (Lima et al. 2017), so a non-detect from a less sensitive method says much less.[3,17] Reporting limits for cadmium ranged from 0.626 µg/kg (de et al. 2021) to 10 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,4] Reporting limits for total arsenic ranged from 3 µg/kg (FDA Total Diet Study) to 5 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 canned tuna

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

## 10 | Exposure from canned tuna

No source in the library converted canned tuna 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 canned tuna was decided on its content: 45 occurrence extracted, 45 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 | Canned tuna FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, methylmercury, inorganic mercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As, Ba, Be, Ca, Hg-inorganic, Mo, Sr and Ti in canned tuna, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in canned tuna as sold from 1,077 results in 3 reporting regions, with subgroup medians below 12 µg/kg, mostly non-detects.[1]

Canned in the studies available Tuna from contaminated or exposed settings carried more metal than canned tuna from the same study's control.[7] canned tuna from sauce-packed had lead higher at 94 µg/kg, against 53 µg/kg for water-packed in the same study.[7]

For cadmium, the HMI reference median was lowest for canned tuna as sold (8 µg/kg) and highest for canned tuna (21 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,5,6,20]

Canned among gems/food reporting regions tuna as sold had the lowest cadmium subgroup median in EURO (9 µg/kg) and the highest in WPRO (11.8 µg/kg); reporting regions are markets, not growing areas.[1] For total mercury, the lowest regional median was in WPRO (45 µg/kg) and the highest in WPRO (170 µg/kg).[1]

Inorganic arsenic, the more toxic form, was measured in 3 results from 2 sources, far fewer than total arsenic.[1,23] WHO GEMS/Food submissions reported inorganic arsenic in canned tuna as sold from 18 results in 1 reporting region, with subgroup medians below 10 µg/kg, mostly non-detects.[1]

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GOVERNMENT

## STATUS AND LICENCE

Editorially reviewed in-house; no external peer review has been completed on this ingredient profile. Published as an institutional technical report with its review state tracked on the article page. Released under CC BY 4.0.

## DATA AVAILABILITY

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

## COMPETING INTERESTS

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