Coconut

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HEAVY METAL INDEX · INGREDIENT PROFILE October 2026

DOI 10.83376/hmi.ingredient.coconut

CITE AS

Pendergrass, K. (2026). Coconut. Heavy Metal Index. https://doi.org/10.83376/hmi.ingredient.coconut

CORRESPONDENCE

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KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-10-22.

Abstract

Coconut in the HMI library has 233 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, Co, Cu, Fe, Mn, Zn, V, Se, Ag, Au, B, Ba, Be, Ca, K, Mg, Mo, Na, P and S from 13 sources. WHO gems/food submissions reported lead in coconut oil from 197 results in 4 reporting regions, with subgroup medians below 90 µg/kg, mostly non-detects. For cadmium, GEMS/Food gave subgroup medians below 85 µg/kg, mostly non-detects from 11 results.

1 | Coconut overview

Across 4 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 0.681 µg/kg (S-T et al. 2024) to 110 µg/kg (Caridi et al. 2021).[3,7] For cadmium, 3 studies on an as-sold or fresh-weight basis reported means and medians from 10 µg/kg (Famurewa et al. 2023) to 20 µg/kg (Famurewa et al. 2023).[2] Higher results came from contaminated or exposed settings rather than ordinary supply. Coconut oil from unrefined had Mn higher at 46.7 µg/kg, against 2.88 µg/kg for refined in the same study.[3]

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

2 | What counts as coconut

This page covers coconut in 5 forms kept separate in every comparison: coconut oil (113 results), coconut as sold (98 results), coconut flour or meal (11 results), coconut powder or ground (9 results) cooked and coconut (2 results).[1,2,3,4,5,6] Foods made from coconut that have their own pages, such as coconut water, 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 coconut

The evidence on how metals reach coconut comes from studies that compared exposed and ordinary settings. Coconut oil from unrefined had Mn higher at 46.7 µg/kg, against 2.88 µg/kg for refined 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 coconut as sold pools 41 subgroup units from 1 sampling family, with a median of between 2.6 and 15 µg/kg and a middle half spanning below 9 (lower quartile) and between 10 and 30 µg/kg (upper quartile).[1] for lead in coconut oil, the reference median was below 30 µg/kg, with a middle half from below 23.8 to below 82.5 µg/kg across 28 units.[1] for cadmium in coconut as sold, the reference median was between 6 and 10 µg/kg, with a middle half from below 6 to between 14.1 and 16 µg/kg across 31 units.[1]

Among GEMS/Food reporting regions, coconut as sold had the lowest lead subgroup median in PAHO (10 µg/kg) and the highest in SEARO (20 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (14.1 µg/kg) and the highest in WPRO (18.1 µg/kg).[1]

Targeted coconut as sold samples in WPRO had cadmium lower at 17.3 µg/kg, against 18.1 µg/kg for WPRO in the same study.[1]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed coconut in the same study and group. Coconut oil (GEMS/Food contaminants database) had cadmium lower at 5.3 µg/kg, against 8.5 µg/kg for the unprocessed form in the same group (coconut as sold).[8] In another study, cooked coconut (PAHO) had cadmium lower at 10.6 µg/kg, against 14.1 µg/kg for the unprocessed form in the same group (coconut as sold).[1] a third study found that coconut powder or ground (leading supermarkets, Colombo) had Cu higher at 2,000 µg/kg, against 1,600 µg/kg for the unprocessed form in the same group (coconut as sold).[9]

Forms differ in water content, so a per-kilogram difference is not by itself a measured removal or gain of metal.

6 | Mitigation for coconut

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 coconut for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 500 µg/kg (WMMPDK et al. 2010), so a non-detect from a less sensitive method says much less.[1,9] Reporting limits for cadmium ranged from 2.5 µg/kg (WHO GEMS/Food) to 500 µg/kg (WMMPDK et al. 2010), so a non-detect from a less sensitive method says much less.[1,9] Reporting limits for total arsenic ranged from 3 µg/kg (WHO GEMS/Food) to 500 µg/kg (WMMPDK et al. 2010), so a non-detect from a less sensitive method says much less.[1,9]

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

9 | Buying and verifying coconut

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

10 | Exposure from coconut

No source in the library converted coconut 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 coconut was decided on its content: 13 occurrence extracted, 13 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 | Coconut FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, Co, Cu, Fe, Mn, Zn, V, Se, Ag, Au, B, Ba, Be, Ca, K, Mg, Mo, Na, P and S in coconut, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in coconut oil from 197 results in 4 reporting regions, with subgroup medians below 90 µg/kg, mostly non-detects.[1]

In the studies available, coconut from contaminated or exposed settings carried more metal than coconut from the same study's control.[3] coconut oil from unrefined had lead higher at 2.09 µg/kg, against 0.681 µg/kg for refined in the same study.[3]

Among GEMS/Food reporting regions, coconut as sold had the lowest lead subgroup median in PAHO (10 µg/kg) and the highest in SEARO (20 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (14.1 µg/kg) and the highest in WPRO (18.1 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same coconut.[8] coconut oil (GEMS/Food contaminants database) had cadmium lower at 5.3 µg/kg, against 8.5 µg/kg for the unprocessed form in the same group (coconut as sold).[8]

Inorganic arsenic, the more toxic form, was measured in 4 results from 2 sources, far fewer than total arsenic.[1,10] European Food Safety Authority (EFSA) 2014 reported inorganic arsenic at 5.2 µg/kg (mean) in coconut as sold from European dietary-survey occurrence data.[10]

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STATUS AND LICENCE

COMPETING INTERESTS

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.

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DATA AVAILABILITY

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

PUBLICATION HISTORY

This revision 2026-10-22. The full dated record is maintained at https://heavymetalindex.com/ingredients/coconut.