Wine

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Abstract

Wine in the HMI library has 306 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, Co, Cu, Fe, Mn, Zn, Se, Ba, Ga, Mo, Sr and Tl from 20 sources. WHO gems/food submissions reported lead in wine as sold from 10,700 results in 4 reporting regions, with subgroup medians from 3 to 51.5 µg/kg. For cadmium, GEMS/Food gave subgroup medians from 0.1 to 0.18 µg/kg from 3,067 results.

1 | Wine 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 7 µg/kg (Gavelek et al. 2019) to 12.1 µg/kg (Marín et al. 2018).[3,4] For cadmium, 3 studies with the basis not stated reported means and medians from 0.43 µg/kg (Dabeka et al. 1995) to 3 µg/kg (Joint FAO/WHO Expert Committee on Food Additives 2022).[7,8]

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

2 | What counts as wine

This page covers wine in 2 forms kept separate in every comparison: wine as sold (280 results) and wine juice (26 results).[1,2,3,4,5,6] Foods made from wine that have their own pages, such as red wine, white wine and wine vinegar, 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 wine

No study in the library compared wine 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 wine as sold pools 89 subgroup units from 1 sampling family, with a median of between 8 and 15.3 µg/kg and a middle half spanning between 3 and 7.5 (lower quartile) and between 12.2 and 20 µg/kg (upper quartile).[1] for lead in wine juice, the reference median was between 6.5 and 13 µg/kg, with a middle half from below 6.5 to between 15 and 18 µg/kg across 35 units.[1] for cadmium in wine as sold, the reference median was below 0.9 µg/kg, with a middle half from below 0.4 to between 0.25 and 5 µg/kg across 79 units.[1]

Among GEMS/Food reporting regions, wine as sold had the lowest lead subgroup median in PAHO (3 µg/kg) and the highest in SEARO (51.5 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (0.1 µg/kg) and the highest in PAHO (0.18 µg/kg).[1]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed wine in the same study and group. Wine juice (PAHO) had lead lower at 4 µg/kg, against 19.6 µg/kg for the unprocessed form in the same group (wine as sold).[1] In another study, wine juice (GEMS/Food contaminants database) had cadmium higher at 3 µg/kg, against 1.7 µg/kg for the unprocessed form in the same group (wine as sold).[8] a third study found that wine juice (European dietary-survey occurrence data) had inorganic arsenic higher at 10.4 µg/kg, against 5.8 µg/kg for the unprocessed form in the same group (wine as sold).[10]

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

6 | Mitigation for wine

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 wine for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 0.6 µg/kg (WHO GEMS/Food) to 20,000 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 (WHO GEMS/Food) to 2,000 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 2 µg/kg (WHO GEMS/Food) to 250 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1]

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

9 | Buying and verifying wine

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

10 | Exposure from wine

No source in the library converted wine 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 wine was decided on its content: 20 occurrence extracted, 20 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 | Wine FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, Co, Cu, Fe, Mn, Zn, Se, Ba, Ga, Mo, Sr and Tl in wine, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in wine as sold from 10,700 results in 4 reporting regions, with subgroup medians from 3 to 51.5 µg/kg.[1]

Among GEMS/Food reporting regions, wine as sold had the lowest lead subgroup median in PAHO (3 µg/kg) and the highest in SEARO (51.5 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in PAHO (0.1 µg/kg) and the highest in PAHO (0.18 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same wine.[1] wine juice (PAHO) had lead lower at 4 µg/kg, against 19.6 µg/kg for the unprocessed form in the same group (wine as sold).[1]

Inorganic arsenic, the more toxic form, was measured in 11 results from 4 sources, far fewer than total arsenic.[1,4,11,10] Marín et al. 2018 reported inorganic arsenic at 0.7 µg/kg (mean) in wine as sold from Alcoholic beverages group, Region of Valencia TDS 2010-2011.[4]

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STATUS AND LICENCE

COMPETING INTERESTS

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DATA AVAILABILITY

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

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