Tomato sauce

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Abstract

Tomato sauce in the HMI library has 140 reported results for lead, cadmium, total arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Fe and As from 8 sources. WHO GEMS/Food submissions reported lead in tomato sauce as sold from 120 results in 4 reporting regions, with subgroup medians from 2.65 to 350 µg/kg. In the US Total Diet Study, canned tomato sauce had a median lead result below 4 µg/kg across 3 composites from 2018-2020.

1 | Tomato sauce 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 6 µg/kg (Grochowska-Niedworok et al. 2020) to 57 µg/kg (Muniz et al. 2018).[3,4] For cadmium, 3 studies on an as-sold or fresh-weight basis reported means and medians from 2 µg/kg (Muniz et al. 2018) to 21 µg/kg (Spungen et al. 2024).[4,7] Higher results came from contaminated or exposed settings rather than ordinary supply. Tomato sauce as sold from metal can, all retail samples had tin higher at 181 µg/kg, against 56 µg/kg for cellulosic carton, all retail samples in the same study.[4]

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

2 | What counts as tomato sauce

This page covers tomato sauce in 2 forms kept separate in every comparison: tomato sauce as sold (131 results) canned and tomato sauce (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 tomato sauce

The evidence on how metals reach tomato sauce comes from studies that compared exposed and ordinary settings. Tomato sauce as sold from metal can, all retail samples had tin higher at 181 µg/kg, against 56 µg/kg for cellulosic carton, all retail samples in the same study.[4]

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 tomato sauce as sold pools 29 subgroup units from 4 sampling families, with a median of between 12 and 16 µg/kg and a middle half spanning below 4 (lower quartile) and 20 µg/kg (upper quartile).[1,3,4,5] canned for lead in tomato sauce, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 4 units.[2,7] for cadmium in tomato sauce as sold, the reference median was 10 µg/kg, with a middle half from 5 to 17.7 µg/kg across 30 units.[1,4,5]

Among GEMS/Food reporting regions, tomato sauce as sold had the lowest lead subgroup median in WPRO (2.65 µg/kg) and the highest in EMRO (350 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in WPRO (18.2 µg/kg) and the highest in PAHO (20 µg/kg).[1]

Targeted tomato sauce as sold samples in WPRO had cadmium lower at 10 µg/kg, against 18.2 µg/kg for WPRO in the same study.[1]

In one study, lead across 4 groups of tomato sauce ranged from 13 µg/kg (plastic container, product line 2) to 40 µg/kg (metal can, product line 1); the lowest is the lowest observed in that study, not an established sourcing preference.[4]

5 | Processing, cooking and preparation

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

6 | Mitigation for tomato sauce

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.[4] 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 tomato sauce for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 2 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 1 µg/kg (WHO GEMS/Food) to 6.67 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 1.2 µg/kg

(Stojanović et al. 2021) to 5 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,5]

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

9 | Buying and verifying tomato sauce

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

10 | Exposure from tomato sauce

No source in the library converted tomato sauce 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 tomato sauce was decided on its content: 8 occurrence extracted, 8 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 | Tomato sauce FAQs

The library reports lead, cadmium, total arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, uranium, Fe and As in tomato sauce, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in tomato sauce as sold from 120 results in 4 reporting regions, with subgroup medians from 2.65 to 350 µg/kg.[1]

In the studies available, tomato sauce from contaminated or exposed settings carried more metal than tomato sauce from the same study's control.[4] tomato sauce as sold from cellulosic carton, all retail samples had lead higher at 57 µg/kg, against 35 µg/kg for metal can, all retail samples in the same study.[4]

Among GEMS/Food reporting regions, tomato sauce as sold had the lowest lead subgroup median in WPRO (2.65 µg/kg) and the highest in EMRO (350 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in WPRO (18.2 µg/kg) and the highest in PAHO (20 µg/kg).[1]

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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/tomato-sauce#sources.

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