Chicken

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Abstract

Chicken in the HMI library has 1,994 reported results for lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, total mercury, methylmercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As_extractable, As_nonextractable, AsIII, AsV, B, Ba, Be, Bi, Ca, CrIII, CrVI, I, K, Li, Mg, Mo, Na, P, REE_sum, Roxarsone, Si, Sr, Tl and Unknown As species from 61 sources. WHO gems/food submissions reported lead in chicken as sold from 7,752 results in 3 reporting regions, with subgroup medians from 7.3 to 448 µg/kg. In the US Total Diet Study, cooked chicken had a median lead result below 4 µg/kg across 27 composites from 2017-2020.

1 | Chicken overview

Across 11 other studies of ordinary farms and markets, reported lead means and medians on an as-sold or fresh-weight basis ranged from 2 µg/kg (Spungen et al. 2024) to 7,540 µg/kg (Chowdhury et al. 2024).[4,8] For cadmium, 12 studies on an as-sold or fresh-weight basis reported means and medians from 0.3 µg/kg (Mathaiyan et al. 2021) to 400 µg/kg (Chowdhury et al. 2024).[4,9] Higher results came from contaminated or exposed settings rather than ordinary supply. Chicken as sold from conventional factory feed, floor housing (1st control group) (experiment) had lead higher at 24.7 µg/kg, against 3.53 µg/kg for conventional factory feed, cage housing (2nd control group) in the same study.[10]

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

2 | What counts as chicken

This page covers chicken in 6 forms kept separate in every comparison: chicken as sold (1,726 results), cooked chicken (153 results), frozen chicken (54 results), canned chicken (37 results), chicken powder or ground (20

results) peeled or flesh and chicken (4 results).[1,2,3,4,5,6] Foods made from chicken that have their own pages, such as chicken broth, chicken noodle soup, chicken nuggets and chicken potpie, 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 chicken

The evidence on how metals reach chicken comes from studies that compared exposed and ordinary settings. Chicken as sold from conventional factory feed, floor housing (1st control group) (experiment) had lead higher at 24.7 µg/kg, against 3.53 µg/kg for conventional factory feed, cage housing (2nd control group) in the same study.[10] In another study, chicken as sold from household-kept hens, tissue content (Table 3) (experiment) had Cu higher at 4,600 µg/kg, against 910 µg/kg for control group, main diet (Table 6) in the same study.[22] a third study found that chicken as sold from frozen drumstick, grocery shops, Umuahia had cadmium higher at 94 µg/kg, against 19 µg/kg for fresh drumstick, poultry farms around Umuahia in the same study.[23]

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 cooked reference median was lowest for chicken (1.95 µg/kg) and highest for chicken as sold (11.9 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,6,8,26] The hmi reference for lead in chicken as sold pools 10 subgroup units from 4 sampling families, with a median of between 31 and 36 µg/kg and a middle half spanning below 5.06 (lower quartile) and 391 µg/kg (upper quartile).[13,27,28,29] cooked for lead in chicken, the reference median was below 4 µg/kg, with a middle half from below 4 to below 4 µg/kg across 109 units.[2,8] for lead in chicken as sold, the reference median was between 5.9 and 6.1 µg/kg, with a middle half from below 5.9 to between 6.1 and 10 µg/kg across 79 units.[1,6]

Among GEMS/Food reporting regions, chicken as sold had the lowest lead subgroup median in PAHO (7.3 µg/kg) and the highest in WPRO (448 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in EURO (1.31 µg/kg) and the highest in EMRO (24 µg/kg).[1]

In one study, lead across 12 groups of chicken ranged from 334 µg/kg (poultry brand 2 (retail brand category)) to 5,550 µg/kg (poultry brand 6 (retail brand category)); the lowest is the lowest observed in that study, not an established sourcing preference.[30] In another study, lead across 10 groups of chicken ranged from 11.5 µg/kg (live chicken slaughter shops, Coimbatore) to 1,960 µg/kg (live chicken slaughter shops, Chennai); the lowest is the lowest observed in that study, not an established sourcing preference.[9]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed chicken in the same study and group. Cooked chicken (central Chennai (street food outlets)) had lead higher at 960 µg/kg, against 600 µg/kg for the unprocessed form in the same group (chicken as sold).[11] In another study, peeled or flesh chicken (Lahore markets (5 markets pooled)) had lead higher at 962 µg/kg, against 504 µg/kg for the unprocessed form in the same group (chicken as sold).[31] cooked a third study found that chicken (Ottawa composite (retail Oct-Nov 2000)) had total mercury higher at 0.44 µg/kg, against 0.35 µg/kg for the unprocessed form in the same group (chicken as sold).[32]

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

6 | Mitigation for chicken

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.[10] 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 chicken for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 0.12 µg/kg (Cosmas et al. 2024) to 25,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,28] Reporting limits for cadmium ranged from 0.67 µg/kg (WHO GEMS/Food) to 15,800 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 0.4 µg/kg (Liang et al. 2019) to 1,000 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1,19]

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

9 | Buying and verifying chicken

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

10 | Exposure from chicken

No source in the library converted chicken 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 chicken was decided on its content: 61 occurrence extracted, 61 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 | Chicken FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, dimethylarsinic acid, total mercury, methylmercury, nickel, chromium, aluminum, tin, antimony, uranium, Co, Cu, Fe, Mn, Zn, V, Se, Ag, As_extractable, As_nonextractable, AsIII, AsV, B, Ba, Be, Bi, Ca, CrIII, CrVI, I, K, Li, Mg, Mo, Na, P, REE_sum, Roxarsone, Si, Sr, Tl and Unknown As species in chicken, most often lead, cadmium and total arsenic.[1,2,3,4] WHO gems/food submissions reported lead in chicken as sold from 7,752 results in 3 reporting regions, with subgroup medians from 7.3 to 448 µg/kg.[1]

In the studies available, chicken from contaminated or exposed settings carried more metal than chicken from the same study's control.[7] chicken as sold from Local (free-range) chicken, Gwagwalada Area Council, Abuja had lead higher at 3,450 µg/kg, against 1,400 µg/kg for Local (free-range) chicken, Gwagwalada Area Council, Abuja in the same study.[7]

For cadmium, the HMI cooked reference median was lowest for chicken (1.95 µg/kg) and highest for chicken as sold (11.9 µg/kg); forms differ in water content, so this compares foods as sold or eaten, not uptake.[1,2,6,8,26]

Among GEMS/Food reporting regions, chicken as sold had the lowest lead subgroup median in PAHO (7.3 µg/kg) and the highest in WPRO (448 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in EURO (1.31 µg/kg) and the highest in EMRO (24 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same chicken.[11] cooked chicken (central Chennai (street food outlets)) had lead higher at 960 µg/kg, against 600 µg/kg for the unprocessed form in the same group (chicken as sold).[11]

Inorganic arsenic, the more toxic form, was measured in 31 results from 6 sources, far fewer than total arsenic.[1,33,34,35,36,37] Across 2 other studies of ordinary farms and markets, reported inorganic arsenic means and medians with the basis not stated ranged from 3 µg/kg (Centre for Food Safety FEHD HKSAR 2012) to 7.9 µg/kg (European Food Safety Authority (EFSA) 2014).[36,37]

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DATA AVAILABILITY

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