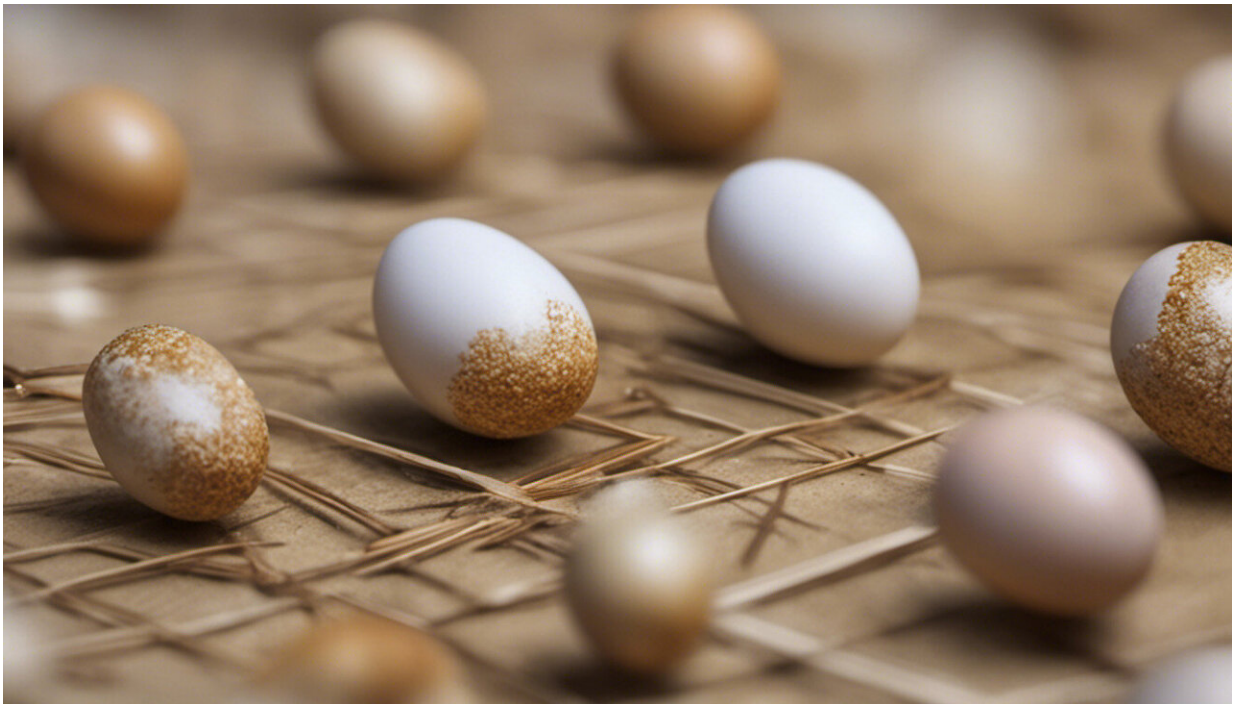


# Backyard hens' eggs in Australia contain 40 times more lead on average than shop eggs, research finds

August 9 2022, by Mark Patrick Taylor, Dorrit E. Jacob and Vladimir Strezov

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Credit: AI-generated image ([disclaimer](#))

There's nothing like the fresh eggs from your own hens, the [more than 400,000](#) Australians who keep backyard chooks will tell you. Unfortunately, it's often not just freshness and flavor that set their eggs

apart from those in the shops.

Our research, newly published in *Environmental Pollution*, found backyard hens' eggs contain, on average, more than 40 times the lead levels of commercially produced eggs. Almost one in two hens in our Sydney study had significant lead levels in their blood. Similarly, about half the eggs analyzed contained lead at levels that may pose a health concern for consumers.

Even low levels of lead exposure are considered [harmful to human health](#), including among other effects [cardiovascular disease](#) and decreased IQ and kidney function. Indeed, the World Health Organization has [stated](#) there is no safe level of lead exposure.

So how do you know whether this is a likely problem in the eggs you're getting from backyard hens? It depends on lead levels in your [soil](#), which vary across our cities. We mapped the areas of high and low risk for hens and their eggs in our biggest cities—Sydney, Melbourne and Brisbane—and present these maps here.

[Our research](#) details lead poisoning of backyard chickens and explains what this means for urban gardening and food production. In older homes close to city centers, contaminated soils can greatly increase people's exposure to lead through eating eggs from backyard hens.



Credit: ROMAN ODINTSOV from Pexels

### **What did the study find?**

Most lead gets into the hens as they scratch in the dirt and peck food from the ground.

We assessed trace metal contamination in backyard chickens and their eggs from garden soils across 55 Sydney homes. We also explored other possible sources of contamination such as animal drinking water and [chicken](#) feed.

Our data confirmed what we had anticipated from our analysis of more

than 25,000 garden samples from Australia gardens collected via the [VegeSafe program](#). Lead is the [contaminant of most concern](#).

The amount of lead in the soil was significantly associated with lead concentrations in chicken blood and eggs. We found potential contamination from drinking water and commercial feed supplies in some samples but it is not a significant source of exposure.

Unlike for [humans](#), there are no guidelines for blood lead levels for chickens or other birds. [Veterinary assessments](#) and research indicate levels of 20 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) or more may harm their health. Our analysis of 69 backyard chickens across the 55 participants' homes showed 45% had blood lead levels above  $20\mu\text{g}/\text{dL}$ .

We analyzed eggs from the same birds. There are no food standards for trace metals in eggs in Australia or [globally](#). However, in the [19th Australian Total Diet Study](#), lead levels were less than  $5\mu\text{g}/\text{kg}$  in a small sample of shop-bought eggs.

The average level of lead in eggs from the backyard chickens in our study was  $301\mu\text{g}/\text{kg}$ . By comparison, it was  $7.2\mu\text{g}/\text{kg}$  in the nine commercial free-range eggs we analyzed.

[International research](#) indicates that eating one egg a day with a lead level of less than  $100\mu\text{g}/\text{kg}$  would result in an estimated blood lead increase of less than  $1\mu\text{g}/\text{dL}$  in children. That's around the level [found in Australian children](#) not living in areas affected by lead mines or smelters. The [level of concern used in Australia](#) for investigating exposure sources is  $5\mu\text{g}/\text{dL}$ .

Some 51% of the eggs we analyzed exceeded the  $100\mu\text{g}/\text{kg}$  "food safety" threshold. To keep egg lead below  $100\mu\text{g}/\text{kg}$ , our modeling of the relationship between lead in soil, chickens and eggs showed soil lead

needs to be under 117mg/kg. This is much lower than the Australian residential guideline for soils of 300mg/kg.

To protect chicken health and keep their blood lead below 20µg/kg, soil concentrations need to be under 166mg/kg. Again, this is much lower than the guideline.

## Where to keep chickens in Sydney

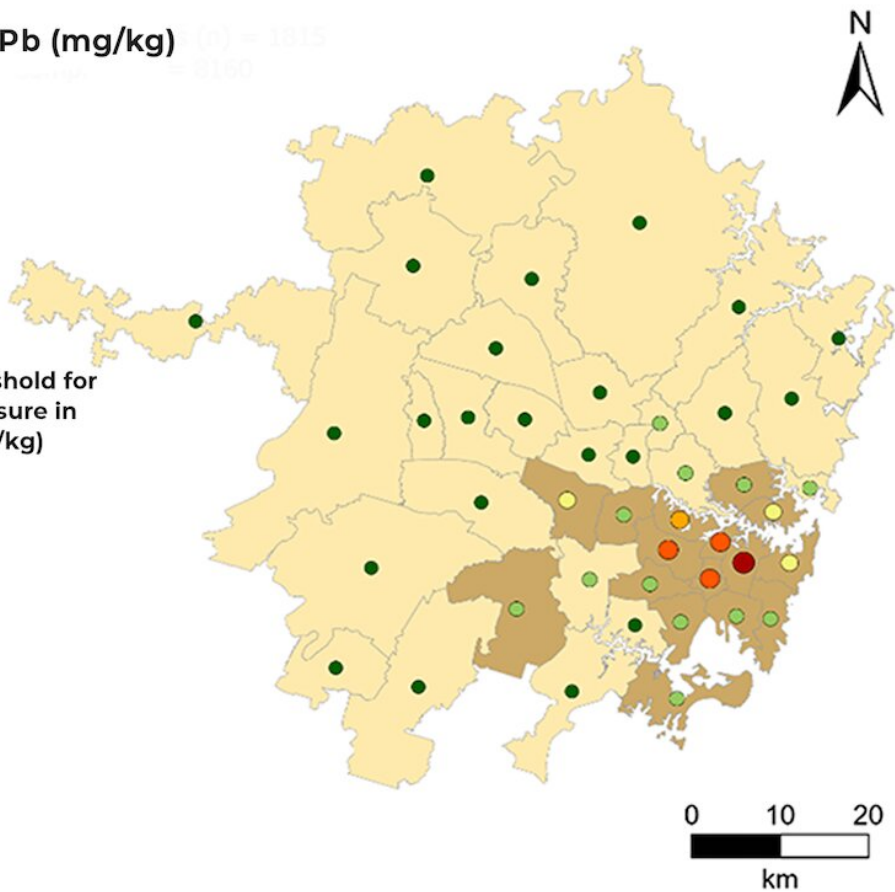
Sampled residences (n) = 1815, Total samples (n) = 8160

### Residential soil Pb (mg/kg)

- 19 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- 401 - 600
- 601 - 697

Soil Pb toxicity threshold for minimising Pb exposure in urban chickens (mg/kg)

- < 117
- ≥ 117



Source: Max M. Gillings, Mark Patrick Taylor

Levels of lead risk for backyard chickens across Sydney. Dark green dots

indicate areas with safe lead levels. Light green and yellow dots are areas over the safe lead level. Orange and red dots indicate areas with high levels. Credit: Max M. Gillings, Mark Patrick Taylor, Author provided

## **How did we map the risks across cities?**

We used our garden soil trace metal database (more than 7,000 homes and 25,000 samples) to map the locations in Sydney, Brisbane and Melbourne most at risk from high lead values.

Deeper analysis of the data showed older homes were much more likely to have high [lead levels](#) across soils, chickens and their eggs. This finding matches other studies that found older homes are most at risk of legacy contamination from the former use of lead-based paints, leaded petrol and lead pipes.

## **What can backyard producers do about it?**

These findings will come as a shock to many people who have turned to backyard food production. It has been on the rise over the past decade, [spurred on recently](#) by soaring grocery prices.

People are [turning to home-grown produce](#) for other reasons, too. They want to know where their food came from, enjoy the security of producing food with no added chemicals, and feel the closer connection to nature.

# Where to keep chickens in Melbourne

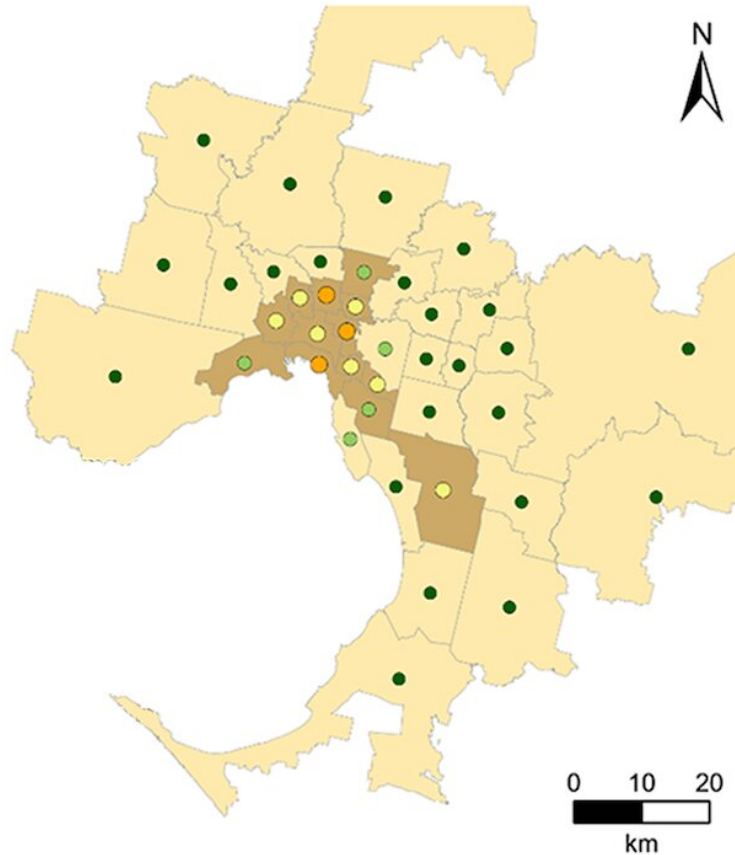
Sampled residences (n) = 1176, Total samples (n) = 5993

## Residential soil Pb (mg/kg)

- 18 - 100
- 101 - 200
- 201 - 300
- 301 - 397

## Soil Pb toxicity threshold for minimising Pb exposure in urban chickens (mg/kg)

- < 117
- ≥ 117



Source: Max M. Gillings, Mark Patrick Taylor

Map of Melbourne showing levels of lead risk for backyard chickens. Dark green dots indicate areas with safe lead levels. Light green and yellow dots are areas over the safe lead level. Orange and red dots indicate areas with high levels. Credit: Max M. Gillings, Mark Patrick Taylor, Author provided

## Where to keep chickens in Brisbane

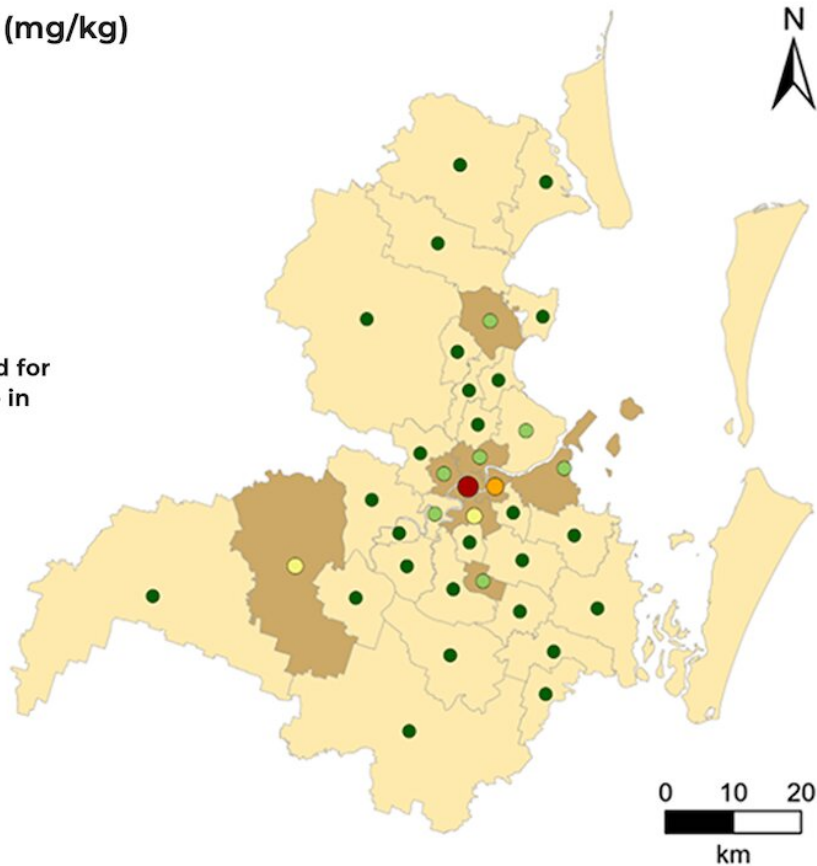
Sampled residences (n) = 242, Total samples (n) = 1230

### Residential soil Pb (mg/kg)

- 9 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- 401 - 600
- 601 - 624

### Soil Pb toxicity threshold for minimising Pb exposure in urban chickens (mg/kg)

- < 117
- ≥ 117



Source: Max M. Gillings, Mark Patrick Taylor

Map of Brisbane showing levels of lead risk for backyard chickens. Dark green dots indicate areas with safe lead levels. Light green and yellow dots are areas over the safe lead level. Orange and red dots indicate areas with high levels.

Credit: Max M. Gillings, Mark Patrick Taylor, Author provided

While urban gardening is a hugely important activity and should be encouraged, previous studies of [contamination of Australian home](#)



[garden soils](#) and [trace metal uptake into plants](#) show it needs to be undertaken with caution.

Contaminants have built up in soils over the many years of our cities' history. These legacy contaminants can enter our food chain via [vegetables](#), [honey bees](#) and [chickens](#).

Urban gardening exposure risks have typically focused on [vegetables and fruits](#). Limited attention has been paid to backyard chickens. The challenge of sampling and finding participants meant many previous studies have been smaller and have not always analyzed all possible exposure routes.

Mapping the risks of contamination in soils enables backyard gardeners and chicken keepers to consider what the findings may mean for them.

Particularly in older, inner-city locations, it would be prudent to get their soils tested. People can do this at [VegeSafe](#) or through a commercial laboratory. Soils identified as a problem can be replaced and chickens kept to areas of known clean soil.

**More information:** Tahereh Yazdanparast et al, Lead poisoning of backyard chickens: Implications for urban gardening and food production, *Environmental Pollution* (2022). [DOI: 10.1016/j.envpol.2022.119798](#)

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