

# Influence of artisanal mining and environmental pollutants on food security in Southern Africa: a systematic review

P2-H10

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## Mercury is the heavy metal most used in artisanal mining with negative environmental impacts in food insecurity.

### BACKGROUND

Environmental pollutants are an emerging global problem, which have been contributing to millions of deaths and significant losses at economical and societal levels. Mining activities produce pollutants with challenges at occupational, environmental, and social domains, also causing health concerns to the affected communities and populations. From the mining discharges, heavy metals are the most studied but their potential impacts on food security are not well understood yet. For this end, this review aimed at **providing an overview of environmental pollutants, relating studies with influence on food insecurity that have been carried out in Southern Africa, with a particular emphasis on those hosting artisanal mining activities**. This research has guided by the following questions: (i) in which countries environmental pollutants impacts on food safety have been studied? (ii) what health effects related to nutrition and ASM exposures to health hazards (environmental) were studied? (iii) which type of environmental samples were collected? (iv) what type of exposures were measured? (v) what population groups were included in the studies?

### METHODS

A systematic review of peer-reviewed publications was conducted, using available electronic databases (PubMed, Science Direct, Scielo, EBSCO (b-on) and Google Scholar) from January 2013 to September 2023. Publications were selected from databases by titles and abstracts, according to inclusion criteria, namely: 1) specifically focused on Southern Africa region; 2) focused on environmental pollutants; 3) related to artisanal mining; and 4) with impact on food safety and food insecurity. Information on environmental exposure and consequent human risks and impacts in the artisanal small-scale mining context in Southern Africa were analyzed.

### RESULTS

Our search yielded 867 records, and after systematic screening, 74 scientific publications were retained for final analysis, among the 16 Southern Africa countries. The number of published articles per country ranged from 0 to 16, being South Africa (n=16), Zimbabwe (n=11) and Mozambique (n=8), the countries accounted for 47% of publications (Figure 1).



Figure 1. Geographical distribution of the selected scientific publications (n=74) per country in Southern Africa.

### RESULTS (cont.)

Of the studies analyzed, 58% are related to food security. However, only 9 (12%) studies address the risks and impacts on food security arising from artisanal mining activities. A total of 29 metals are reported in the analyzed studies, from which Hg (mercury) is the most studied metal in artisanal mining areas (Figure 2).

The environmental samples most analyzed in studies related to mining activities are water (n=7), and food (n=6) with the main metals explored being Hg, Pb, Cd, Zn and As. The most investigated human samples are urine (46%) and blood (45%), when compared to air (9%). More than half of the studies includes miners (78% [7/9]), when compared to those, that include residents and surrounding communities (22% [2/9]); none include healthcare professionals.

Type of commodities by number of scientific publications

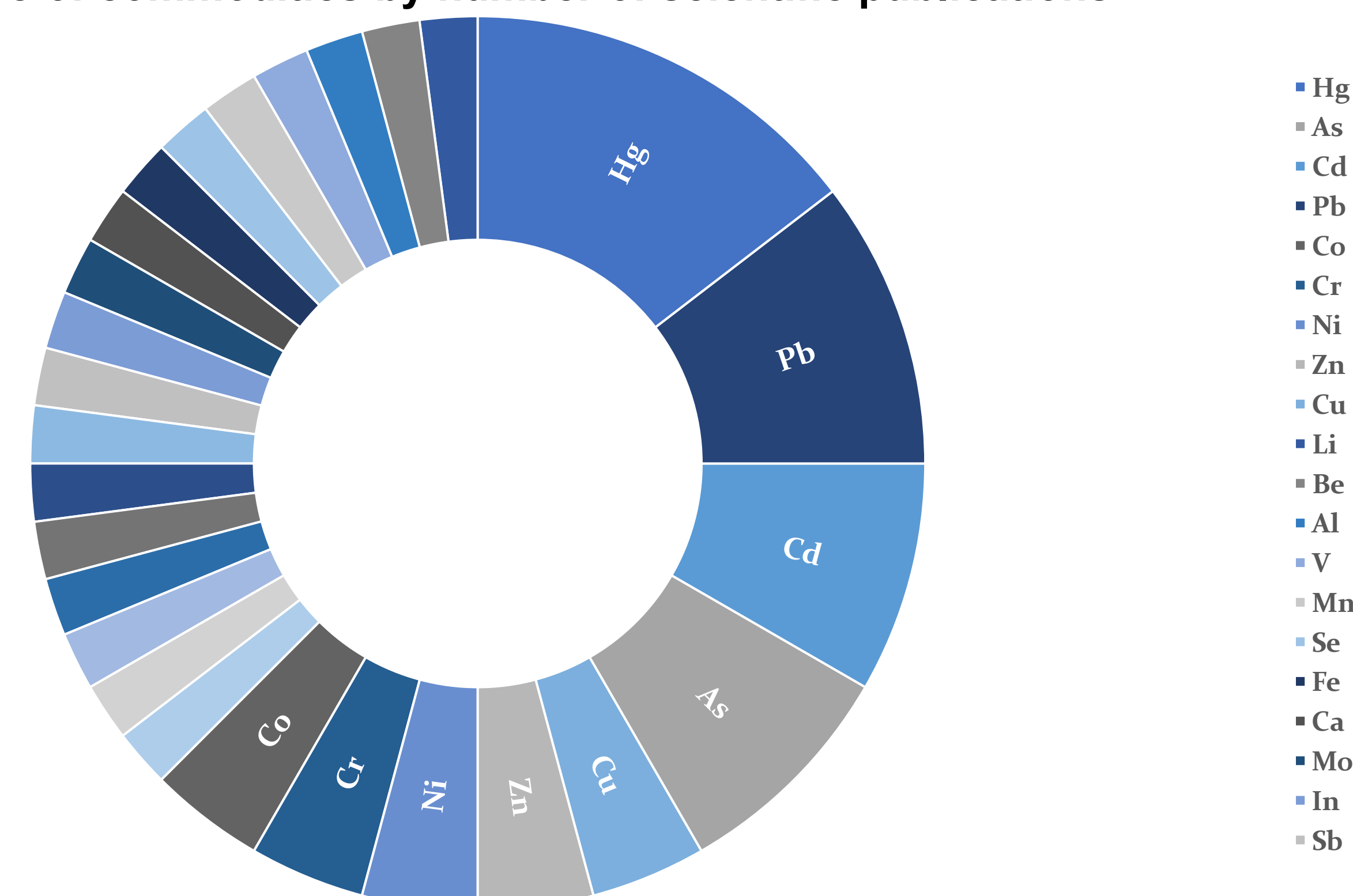


Figure 2. Type of studied metals by number of scientific publication (n=74) in Southern Africa (2013-2023).

### CONCLUSIONS

In the past decade, environmental pollutants-related studies have gained more attention from the scientific community, along with the concern on generating evidence on the effects of mining activities on human health. It is clearly understood that **mercury is the heavy metal on the center of attention** with a significant existing body of literature describing its effects **on human health**. However, the **literature lacks pathways and evidence that may influence food safety in surrounding communities exposed to mining activities**.

### ADDITIONAL KEY INFORMATION

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