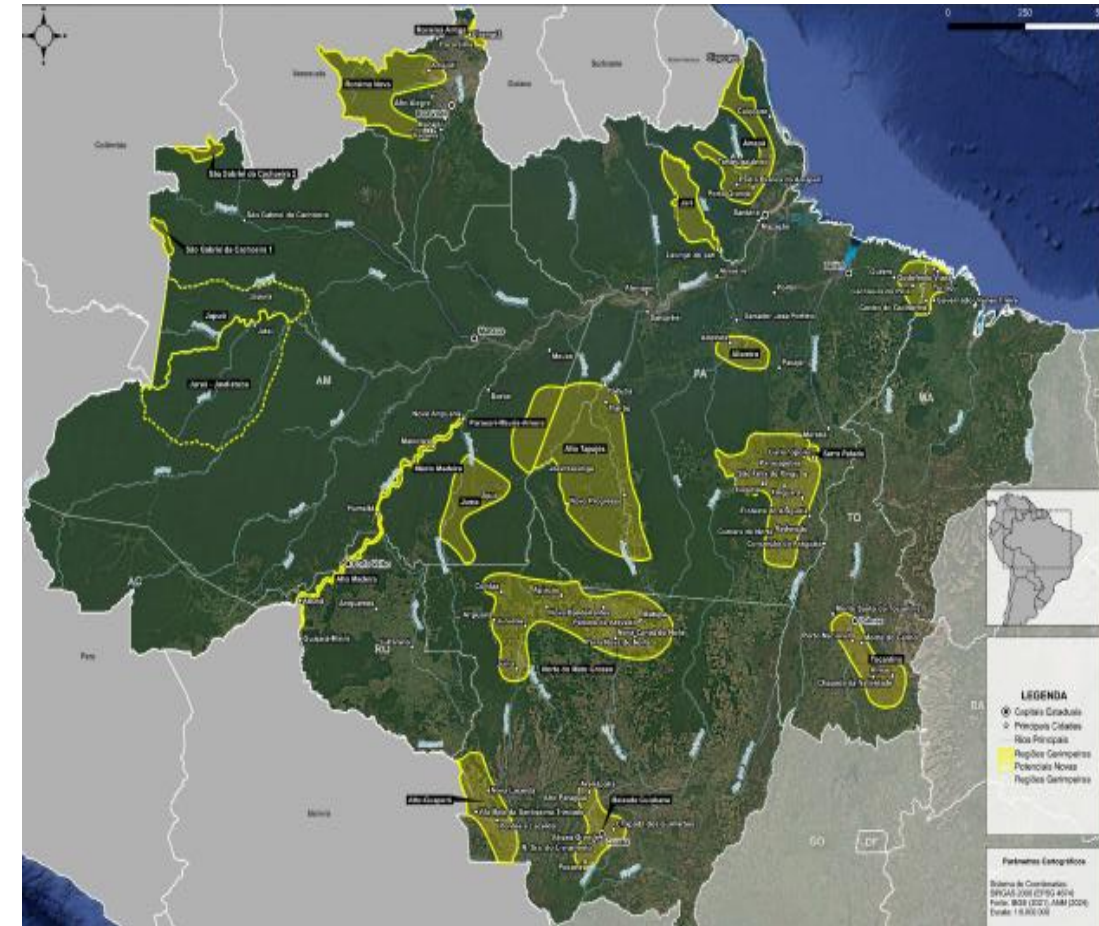


# **Occupational Safety and Health in Small-Scale Gold Mining across the Brazilian Amazon**

Carlos Henrique Xavier Araujo, PhD  
Mining Engineer and Researcher  
University of São Paulo (USP)

# Small-scale mining in Brazil

1. One of the world's **most geologically diverse countries**, extracting over 70 mineral substances.
2. A relevant producer of **critical minerals**, including niobium, lithium and rare earth elements.
3. ASGM in Brazil is mostly conducted by autonomous miners, cooperatives, and associations. The sector provides livelihoods for more than **200,000 workers**.
4. In Brazil, the **ASGM sector is rapidly growing and is concentrated in the Amazon**.
5. The sector brings together **different legal arrangements and diverse organizational practices**.



Map by [Sohn \(2024\)](#)

**ASGM “garimpos” regions of the Brazilian Legal Amazon often occurs in smaller, dispersed deposits that are not suitable for large-scale extraction**

# Minamata Convention on Mercury

Brazil officially ratified the Minamata Convention on Mercury in 2017.

Under the Convention, countries that have ASGM activities involving mercury amalgamation are required to take concrete steps to **reduce**, and where feasible eliminate, the use of **mercury** and mercury compounds.

Between 2022 and 2025, the **Project “Gold Without Mercury”** - [Ouro sem Mercúrio](#) supported the development of Brazil National Action Plan for Artisanal and Small-Scale Gold Mining. This work included extensive field assessments, technical studies, and workshops/focus groups with miners and cooperatives across the Amazon.



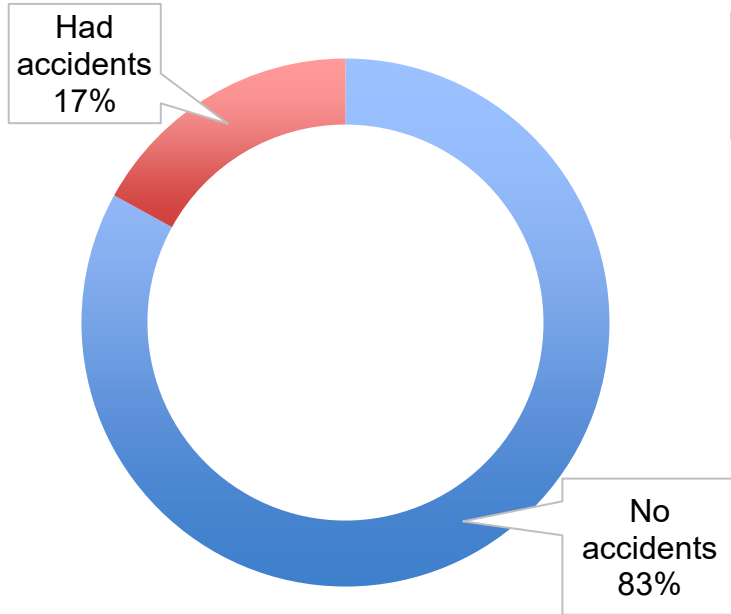
**10 Reports** on the national  
overview of the Brazilian  
ASGM sector

**1051 miners**  
interviewed in five  
Brazilian states  
in Amazon Region

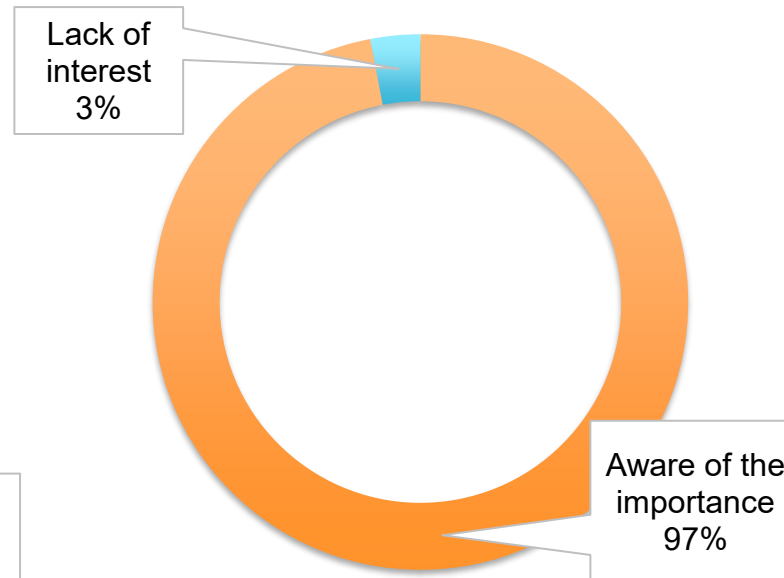
**10** workshops  
focusing on mercury,  
gender, and the future  
of ASGM.

**43**  
mining sites  
visited

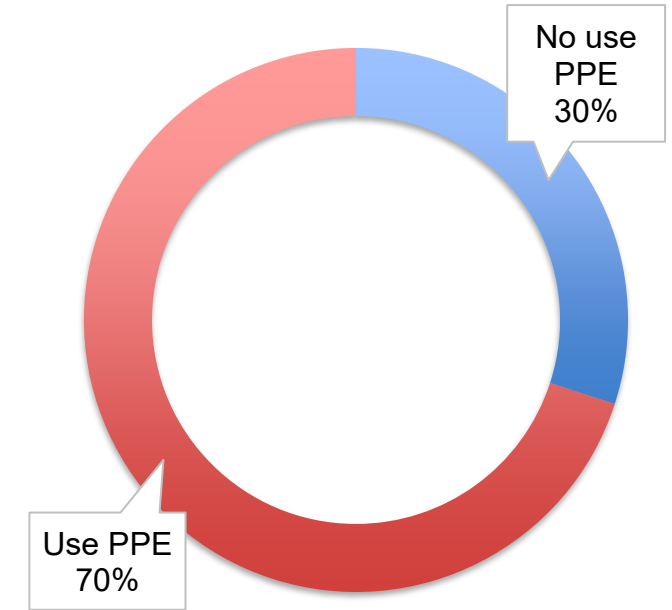
# Safety equipment use



**83% of miners reported no accidents working in the mine and 17% reported having accidents (n = 1051)**

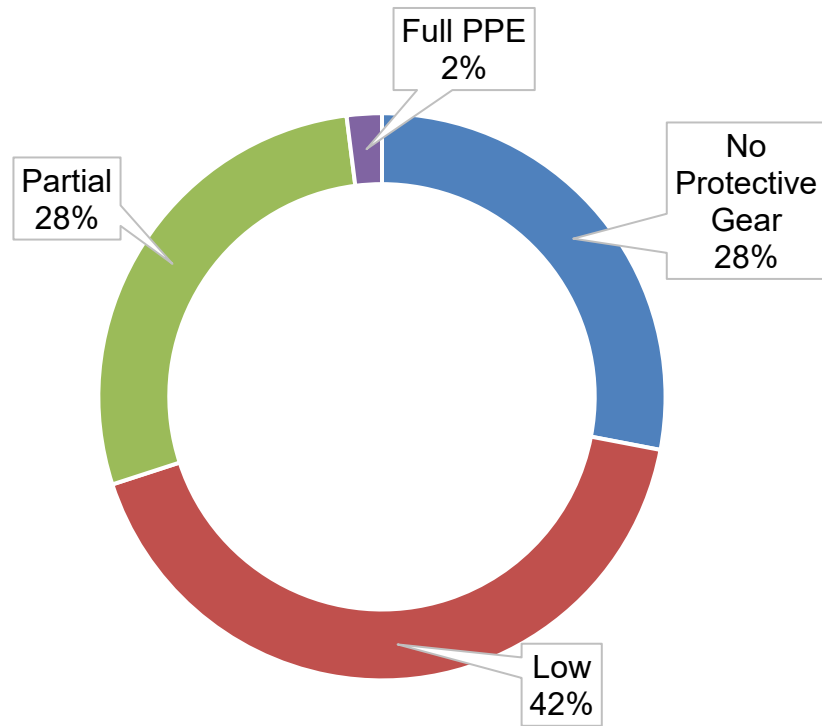


**97% of miners recognized the importance of Personal Protective Equipment (PPE) (n = 1051)**



**Based on field observations, only 70% used PPE during activities, and 30% were working without any safety equipment use (n = 43)**

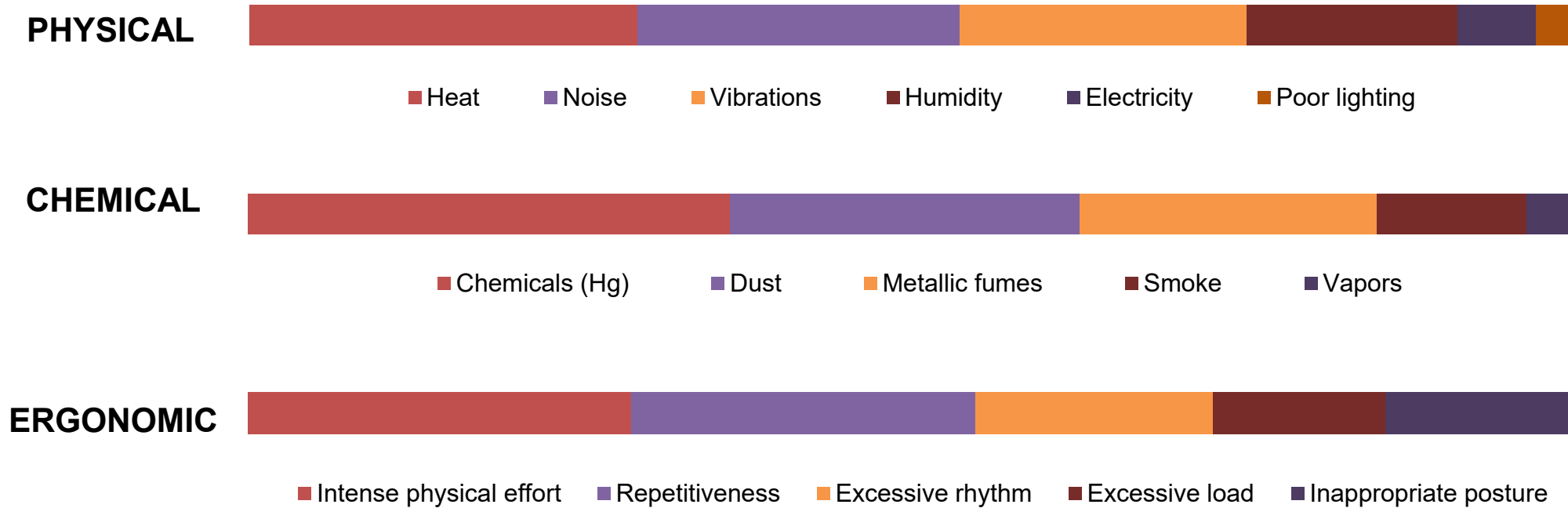
# Safety equipment use



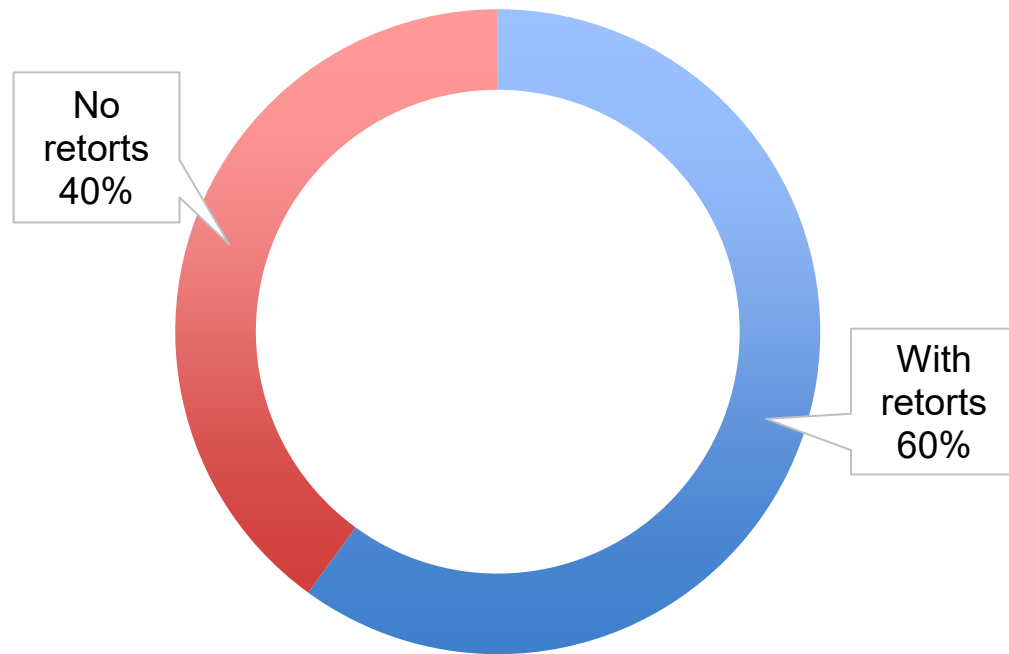
- No Protective Gear
- Low PPE, only one (Boots or Hearing protection)
- Partial, two or three (boots, Helmet, Gloves)
- Full PPE, four or + (Boots, Helmet, Gloves, Hearing protection, Reflective strap, Protective glasses)

Across 43 mining visits, the use of personal protective equipment was **mostly low or partial**, with only 2 % using full protective equipment.

# Main OSH risks identified across ASGM sites



# Mercury use



**Retorts were present in most sites visited, but 40% still burned amalgam without mercury recovery.**

**(n = 43)**

**1**

Miners often report that the cost of buying a retort is too high.

Low perception of health risks, which reduces the motivation to change existing practices.

**2**

**3**

Lack of training and technical support for using and maintaining retorts.

**Perception of miners and mine owners about adopting retorts for amalgamation**



# Retorts for amalgamation in the Amazon



Our mercury mass balance results showed retort efficiencies of up to **99%!!!**



Retorts are an **effective method to reduce mercury** use in ASGM.

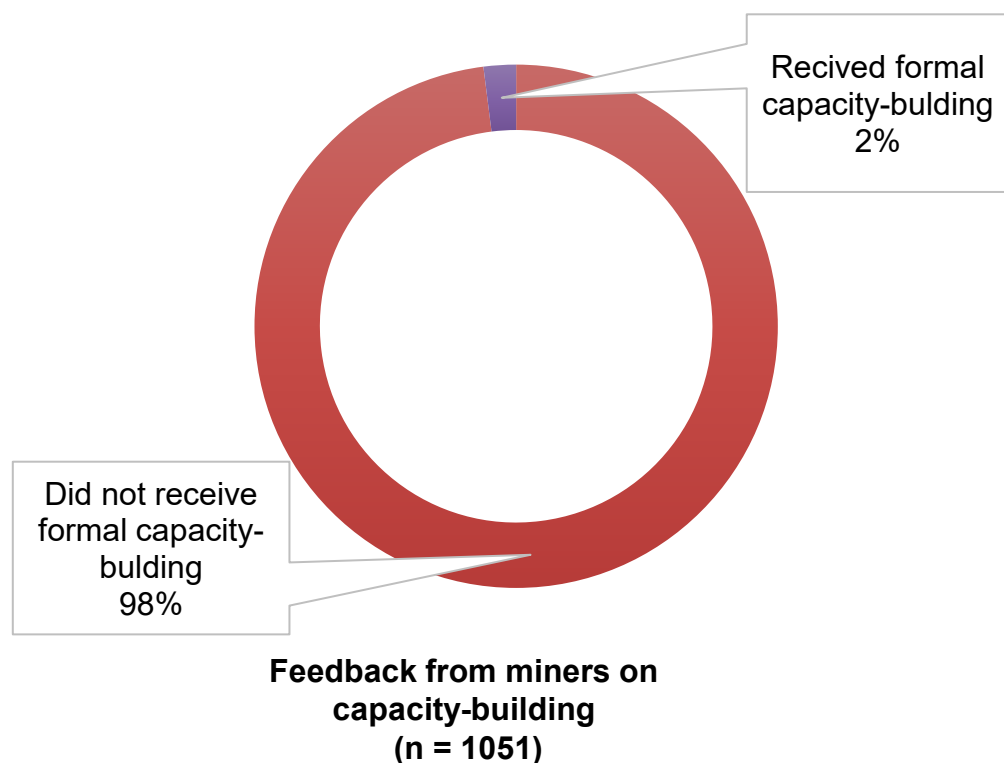


# Main health issues reported by miners during fieldwork

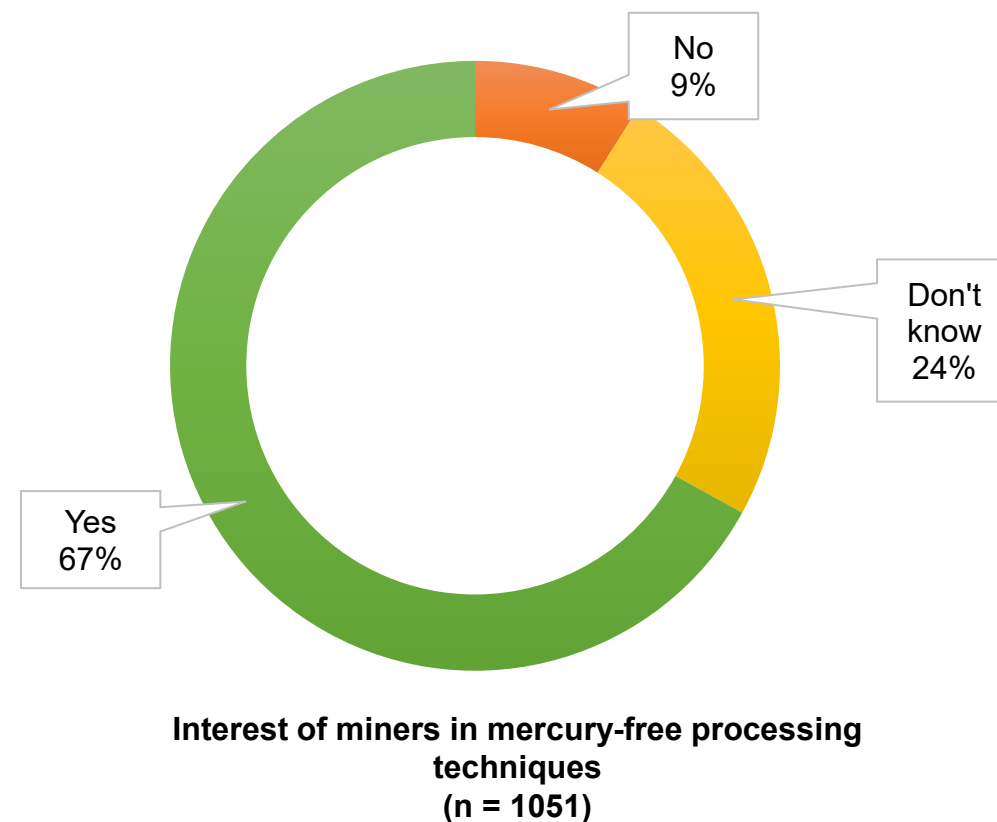
- Infectious and endemic **diseases are very common**, especially dengue (aedes aegypti), malaria, yellow fever, Chagas disease, hepatitis, Covid-19 and measles.
- Miners also **frequently described recurring symptoms**, including persistent headaches, kidney pain, sleep disturbances, blurred vision, dizziness and fatigue.
- **Hospitalizations** were mainly associated with accidents, infectious diseases, and chronic health conditions. Only one case was reported as directly related to mercury exposure.
- Many miners, **especially men, hesitate to seek medical care**. This reluctance is often linked to discomfort, fear of being identified as miners, or concerns about being reported to authorities.



# Feedback from miners on capacity-building

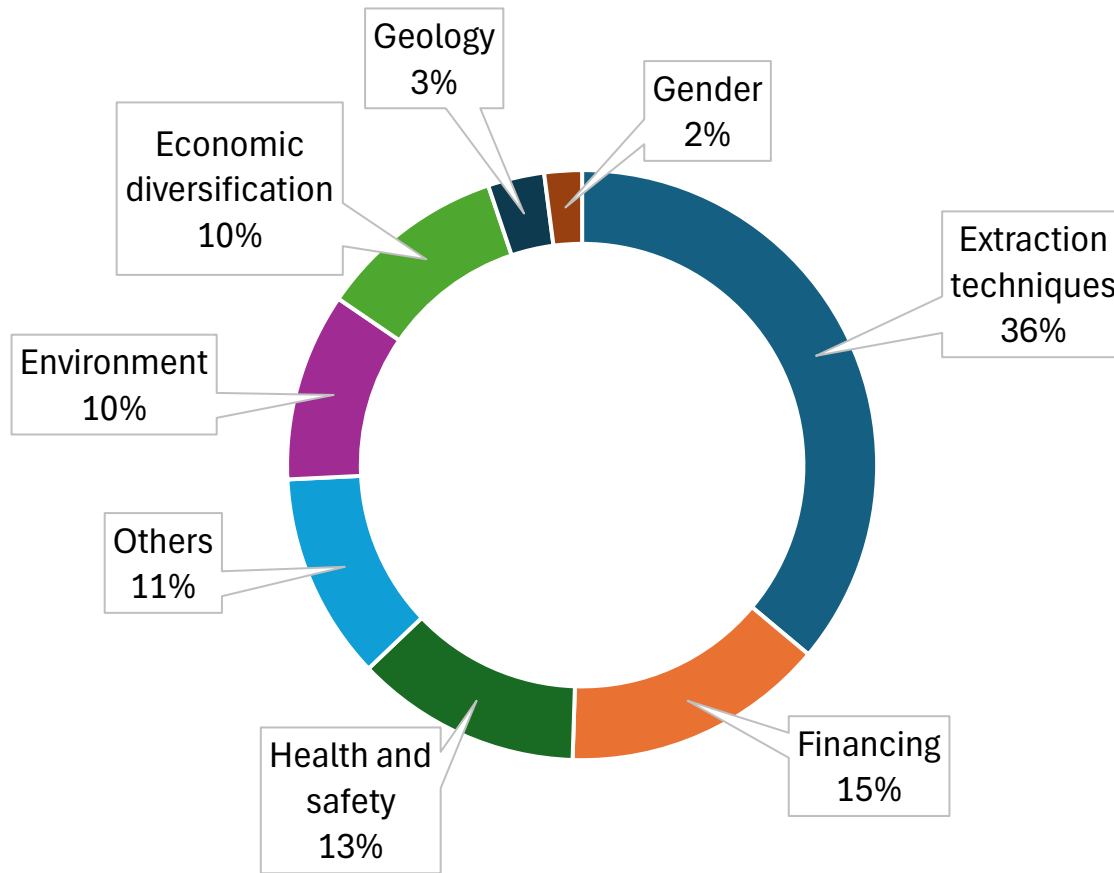


Most training initiatives came from cooperatives, mining companies, or online courses, and covered topics such as cooperative organization, credit, OSH, environmental recovery and mercury use.

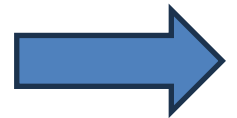


So even though very few miners have access to formal training, there is a strong openness to learning new technical approaches, especially those that reduce or eliminate mercury use.

# Feedback from miners on capacity-building



**“Others”** reflects  
a diverse set of  
interests



During fieldwork, interviewees were asked to choose, from a predefined list, the topics they would most like to learn.

# Feedback from miners on capacity-building

## **Miners (*Garimpeiros(as)*)**

- Extraction and processing techniques
- Mechanical and equipment operation skills
- Mercury (risks, use, alternatives)
- Labor rights and licensing
- Mental health support
- Electronics (computer, radio)

## **Cooks (*Cozinheiras*)**

- Culinary skills and food safety
- Water hygiene and contamination prevention
- Mercury-related health care
- Emotional support
- Management to open your own business

## **Mine Owners (*Donos(as) de garimpo*)**

- Financial management
- Regularization
- Mercury elimination techniques
- Access to financing

## **Dredge Operators (*Operadores de draga*)**

- Electronic injection and welding
- Dredge mechanics and towing
- Mercury-free gold extraction techniques
- Mining regularization
- Religion

# Closing remarks

1. The findings highlight the urgent **need for public policies that integrate health and safety into ASGM**, with emphasis on capacity building, safer technologies, and systematic monitoring of exposure risks.
2. **The transition to reduce emissions and releases and, where feasible, eliminate mercury use in ASGM remains a complex challenge** that requires not only viable technical solutions but also a solid understanding of socio-cultural dynamics.
3. Demonstrating to miners **how much gold is lost during concentration and amalgamation** creates both economic and operational incentives for change. Recognizing gains in recovery, safety, and reduced mercury exposure makes miners more willing **to adopt safer and more efficient methods**.



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**carloshxaj@gmail.com**

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