

Knowledge, Attitudes, and Practice Study on Lead Poisoning and Pollution in Indonesia

Final Report

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Most importantly, this study was only possible thanks to the many community members who welcomed our researchers and shared their experiences with us. We are grateful to the communities for this opportunity and for openly sharing insights into their lives. We hope that the report reflects well their views and experiences and helps shape future programmes.

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Acronyms and abbreviations

| | |
|-----------|---|
| BLL | Blood Lead Level |
| Bupati | district head/regent |
| Cadres | <i>Posyandu Kader</i> (community health worker) |
| KAP | Knowledge, Attitude and Practice |
| pFGD | Participatory Focus Group Discussion |
| PIK | Perkampungan Industri Kecil/small industry village |
| Posyandu | <i>Pos Pelayanan Terpadu</i> - community-based integrated health services providing basic health services to members of the community e.g. clinic sessions for mothers and young children and the elderly, family planning, nutrition, immunization and disease control |
| Puskesmas | Pusat Kesehatan Masyarakat/community health centre |
| ULAB | Used lead-acid battery |
| RT | <i>Rukun Tetangga</i> /neighborhood administrative unit |
| RW | <i>Rukun Warga</i> /community unit |
| SBCC | Social Behaviour Change Communication |
| SMK | Sekolah Menengah Kejuruan/vocational high school |
| UNICEF | United Nations Children's Fund |

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Summary

Executive summary

Purpose and Approach

Though lead exposure poses many short and longer health risks to humans, many people are unaware of lead in their environment and risks of exposure. In Indonesia, this includes more than 36 million children who are estimated to have high lead levels in their blood. However, little is known about people's awareness of lead exposure and their prevention measures. This report presents the findings of a mixed methods study implemented by Empatika and commissioned by Vital Strategies, with the aim to explore people's knowledge, attitudes, and practices (KAP) about lead exposure in Indonesia.

Findings from this study draw on data gathered through a combination of participatory focus group discussions (pFGDs), an in-person household survey and in-person interviews. Data was collected in Tegal District, Central Java and Bogor District, West Java, which were selected based on the presence of lead-acid battery (ULAB) recycling facilities and their history of lead contamination.

Findings

Attitude: People tend to perceive risks from materials that can be observed and give direct or immediate effects, such as thick, black smoke from ULAB smelting activities that people said often cause respiratory problems. As ULAB smelting activities have ended in both Bogor and Tegal and there is no more black smoke, people no longer perceive any health risks from ULAB smelting. However, even in the past when ULAB smelting was still active, people did not consider it to be risky as they could alleviate the immediate respiratory problems caused by the smoke without any long-term health effects.

Risks from ULAB smelting were also considered isolated to certain neighbourhoods as smelting activities were usually centralised in few locations. Waste present from past smelting activities is also not considered dangerous or problematic. People also noticed changes in their environment, particularly groundwater, but did not necessarily associate these with health risks nor past ULAB smelting.

Knowledge: Most people were familiar with ULAB smelting. However, the majority of respondents had never heard "about lead," and those who did considered it to be a visible material rather than a chemical substance. The majority of people did not know the level of lead exposure in their area, nor were they aware of possible sources of lead exposure. The majority of people are not aware of sources of lead exposure other than ULAB smelters. Some identified food, aluminium smelting, drinking water and plumbing as other sources of lead, but most do not consider smelting waste as a source of lead exposure.

While people were not familiar with lead, the majority of respondents considered ULAB smelting to have negative health impacts. Most identified respiratory problems resulting from the smoke as the main effects of lead, and identified children under 5 and the elderly as the most vulnerable to health risks from the smelting. However, there is little knowledge about long-term effects of ULAB smelting, including developmental, cognitive or behavioural challenges.

Practice: People do not currently take action to prevent lead exposure. Even when ULAB smelting was still active, people primarily sought to mitigate the effects of exposure rather than preventing the risks. Though people do boil groundwater that has changed since ULAB smelting or avoid using it for cooking, this is done to avoid its unpleasant taste and smell, rather than to avoid lead exposure. Community-level mitigation efforts have largely been driven by external stakeholders such as land rehabilitation projects and closure of ULAB smelters.

Sources of information: In Bogor and Tegal, people access TV and social media mainly for information about politics, laws, current affairs, as well as entertainment, culture, and sport. Most people rely on health service providers, community leaders, family members, and neighbours for information on health, including children’s health. Many people also considered health ‘socialisations’ of information sessions to be effective, provided that these included opportunities for two-way discussions with service providers. However, most people are not aware of any health programme or promotion related to lead in their communities.

Developing communication for behaviour change

Based on these findings, the study proposes some entry points that can be considered when developing communication for behaviour change. Table below summarises the key gaps in attitude and knowledge and implications for developing key messages.

| | |
|--|--|
| <p>Key gaps in attitude:</p> <ul style="list-style-type: none"> • ULAB smelting considered risky in the past when active, but not currently • ULAB smelting waste not considered risky • Exposure to aluminium or other metal smelting considered normal | <p>Implications for developing key messages:</p> <ul style="list-style-type: none"> • Specific and clear information such as about lead, health effects, why it is dangerous • Practical and doable things that community members can do to prevent lead exposure |
|--|--|

| | |
|--|---|
| <p>Key gaps in knowledge:</p> <ul style="list-style-type: none">• No understanding of lead and inclination to understand lead as something visible• No understanding of sources of lead exposure and channels of exposure• No understanding of the longevity of lead pollution• Little to no knowledge about health effects (immediate and long terms) from lead exposure. | <p>Implications for developing key messages:</p> <ul style="list-style-type: none">• Clear and simple information related to key knowledge gaps• Visuals to accompany these messages that can help people to understand lead and its risks. |
|--|---|

The study also recommends some supporting activities to further support behaviour change. These include providing public information about local lead contamination, enforcing restrictions to reduce lead exposure, regulating smelting activities, and communication training for health providers to better inform people about lead exposure.



Introduction

1. Introduction

Lead exposure has been referred to as the “silent epidemic” as it can lead to serious, even irreversible health issues without notable symptoms.¹ Lead can be found in water from lead pipes, surfaces painted with lead-based paint, and in soil and air from a number of sources including recycling batteries. Humans are mainly exposed to lead through inhalation and ingestion.² High concentrations of lead have been known to cause gastrointestinal issues, hypertension, nerve disorders, and, in chronic cases, lead to paralysis or fatality.³

While lead exposure can cause adverse health impacts for anyone, children under 5 years old are at elevated risk as they absorb lead more readily than adults and have comparatively higher hand-to-mouth activity.⁴ A 2020 UNICEF study on lead poisoning estimated that approximately 800 million children worldwide have a Blood Lead Level (BLL) at or higher than 5 micrograms per deciliter, which carries significant health risks and has been linked to behavioural issues and reduced cognitive development as well as learning capabilities.⁵ In Indonesia, more than 36 million children are estimated to be above this threshold.⁶ Children from lower socio-economic status are at greater risk to lead poisoning as they are more likely to live close to areas with high exposure, such as informal smelting operations, live in un-modernized accommodation with lead pipes, share a house with family members who work with/are exposed to lead, have poor access to health services, and have nutritional deficiency.⁷

Currently, very little information is available related to awareness of lead exposure in Indonesia. Several studies found a lack of awareness about the risk of lead poisoning among parents of children with high BLL, including communities in West Java and Central Java.⁸ On this basis, Vital Strategies and UNICEF engaged Empatika to better understand people's knowledge, attitudes, and practices about lead pollution, which will be used to inform communication strategies to encourage behavioural change in preventing lead exposure. This report is developed with an underlying concept that behaviour is influenced by people's capability, opportunity, and motivation.⁹ In the interest to support a more comprehensive approach to behaviour change, we will use this concept particularly in the last section which identifies potential areas or entry points for social behaviour change communication (SBCC) solutions aimed at promoting positive behaviours.

¹ UNICEF (2020). *The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential 2020*.

² World Health Organization (2021). *Lead Poisoning Fact Sheet*.

³ UNICEF, “The Toxic Truth”.

⁴ US Department of Health and Human Services (2020). *Toxicological Profile for Lead*.

⁵ UNICEF, “The Toxic Truth”.

⁶ Ericson, Bret, et al. “Blood lead levels in low-income and middle-income countries: a systematic review.” *The Lancet Public Health*, vol. 5, no. 3, 1 Mar.

⁷ UNICEF, “The Toxic Truth”.

⁸ Ibid.

⁹ Michie, S., van Stralen, M.M. & West, R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Sci* 6, 42 (2011).

How this report is organised

This report begins by explaining **methodology** used to guide this study, including study process, locations, participants and ethics. This is followed by **context** of the study locations, which mainly highlights the ULAB smelting history in study locations. Findings are then presented grouped by **knowledge, attitudes, and practice related to lead exposure**, including qualitative and quantitative data. The final section **developing communication for behaviour change** provides insights to inform key messages and other communication strategies to support behaviour change.



Methodology

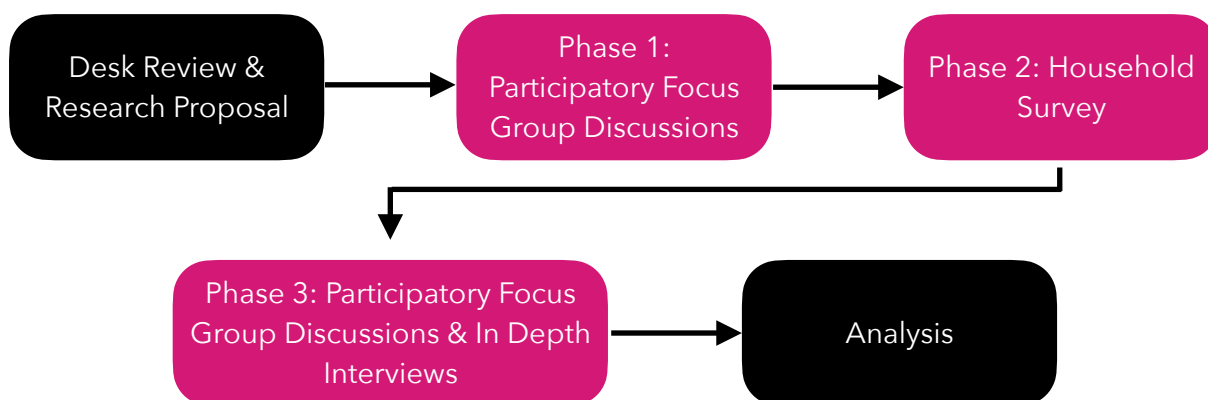
2. Methodology

This study utilised a mixed methods approach in order to gather insights into people's knowledge, experiences, perceptions and behaviour related to lead pollution. This section elaborates the study process used to support this approach, the locations visited and the participants included in the study.

2.1 Study Process

This study was implemented using a multi-phase approach. The first phase of the field research included participatory focus group discussions (pFGDs) with community leaders and parents. The second phase included a survey with 566 households, including the locations of the pFGDs along with three neighbouring communities. For the third phase, researchers returned to the communities for a final set of pFGDs with parents, service providers, and youth. Figure 1 below illustrates this approach.

Graphic 1. Study Process



Desk Review and Research Proposal

The study process started with a desk review which aimed to synthesise existing information on people's knowledge, attitude, and practice (KAP) surrounding lead exposure in Indonesia, particularly in relation to children, as well as to identify gaps in knowledge. The review also included examination of existing interventions to reduce lead risks in other countries and how these have influenced people's behaviour. A research proposal was subsequently developed based on the findings of the desk review detailing the study process, study participants and locations, draft research instruments, and research ethics.

The research proposal, including the desk review section, has been submitted as the first deliverable of this assignment.

During this phase, the geographic focus of the study was also identified based on Vital Strategies scoping. Through this process, the locations of Bogor and Tegal Districts were selected as the primary study locations.

Phase 1: Participatory Focus Group Discussions

Primary data collection for the study began with a day of scoping where researchers did community observation and informal interactions and discussions. This basis of understanding and relationship building set the stage for the initial set of pFGDs with community leaders and parents and caregivers that followed, and also allowed researchers to refine the process and content of the pFGDs. PFGDs combine participatory research approaches and conversation to move away from the traditional question and answer format of focus group discussions to more engaging activities. These discussions included both individual activities and group discussions in order to provide a full exploration of key study topics. Topics discussed in this first phase are presented in the table below.

Table 1. pFGD Participants, Topics, and Activities

| | Participants | Topic & Activity |
|---------|------------------------|--|
| Phase 1 | Parents and caregivers | <ul style="list-style-type: none"> • Childhood risks. Identifying aspirations for and risks to the wellbeing of their children. • Community mapping to identify areas perceived as risks for their children. • How serious is this? ranking comparison of child health risks |
| | Community leaders | <ul style="list-style-type: none"> • Discussing childhood risks and community mapping from the parents group • How serious is this? ranking comparison of child health risks |

Insights from this phase were used to refine the survey questions for the quantitative data collection. In particular, this included refinement of possible answer options and improvements to the sequencing of the questions. Phase 1 insights were also shared with Vital Strategies and UNICEF during a preliminary findings presentation in which questions to include in phases 2 and 3 were also discussed.

Phase 2: Household Survey

The quantitative component of the study consisted of an in-person household survey, administered using a smartphone-based survey application (CSPRO). The survey was designed to complement the qualitative data collection by identifying the wider community's views on lead poisoning and prevention, allowing a deeper analysis and richer understanding of the situation. The survey was administered in the main study communities

in Bogor and Tegal, along with three adjacent communities in the same sub-district to allow for comparison.

Sampling

The household survey was administered at the subdistrict level, including one subdistrict each in Tegal and Bogor which were selected by Vital Strategies (see more in Study Locations). To be eligible to join the survey, all participants were aged 21-60 years old and were parents/caregivers to children under age 18, and live in *Rukun Warga* (RWs, neighbourhood unit) adjoining the RW with former ULAB smelting workshops. Households eligible to participate were first identified with village officials and health providers, after which households were selected randomly. Listed households were randomised using a number generator. Random selection was carried out based on the following household stratification which is purposively designed given the risk of lead poisoning is particularly crucial among children under 5:

- Presence of children under 5 (60% of the respondents) and
- Presence of children aged 5-18 years old (40% of the respondents)

Where a household has children from both age groups, the household will be taken into account in the first category (household with children under 5).

Questionnaire development

The survey questionnaire was developed based on a draft provided by Vital Strategies and was refined based on insights gained during the Phase 1 scoping and pFGDs. These adjustments were shared with Vital Strategies and UNICEF and iterative revisions were incorporated into the final questionnaire. An overview of the survey topics is provided below in Table 2 and the full questionnaire is available in Annex 1.

Table 2. Questionnaire Topics

| Section | Objective |
|---|--|
| Media and information consumption habits | Understanding preferred communication channels |
| Health support | To understand general health practices and practices that relate to lead exposure prevention |
| Knowledge of environmental pollution | Understanding of environmental health and pollution |
| Knowledge of lead exposure, health effects; attitudes, and practises (risk reduction) | Understanding knowledge, attitudes, and practices, included risk reduction behaviours, related to lead pollution |

| | |
|-------------------|---|
| Socio-demographic | Understanding the background of respondents to help understand and guide the targeting of messaging |
|-------------------|---|

The questionnaires were translated from English to Bahasa Indonesia and back-translated to English to ensure the accuracy of the translation. Field testing was carried out by Empatika’s field researcher before data collection in order to improve on the clarity, language and sequencing of questions.

Data was collected using the CSPro application on mobile devices. This approach allowed for on-going quality checks and real time external long distance monitoring including spot checks and back checks helps to identify and correct issues early on.

Phase 3: Participatory Focus Group Discussions and In-Depth Interviews

The second set of pFGDs in Phase 3 built upon insights from the first round of pFGDs (Phase 1) along with preliminary findings from the household survey (Phase 2). The earlier two phases provided insights on people’s knowledge and attitude related to ULAB smelting and other sources of pollutants in their environment. This helped shape Phase 3 to further explore prevention efforts, health messages, and trusted sources of information. This phase was done in the main village and included in-depth interviews as part of follow-up, clarification, and further exploration of the emerging findings from phases 1 and 2. In-depth interviews were conducted with parents and caregivers; smelter/battery recycling workers and kiosk sellers; community leaders, teachers, healthcare workers; and young people.

Table 3 below provides an overview of the phase 3 pFGD participants.



Photo by Empatika team

Participants in one of the pFGDs in Bogor work on their community map.

Table 3. pFGD Participants, Topics, and Activities

| | Participant | Topics/Activities |
|-------------------|--|---|
| pFGD | Parents and caregivers Service providers Youth | <ul style="list-style-type: none"> • Scenario to understand people’s views on risks from ULAB, views on safety measures and government role • Health messages and sources of information to explore people’s views about hidden risks of lead and their trusted sources of health information • Ranking actions to explore people’s views on prevention at household and community levels |
| Interviews | Parents and caregivers, youth | Aspirations, health risks including challenges and support, information sharing |
| | Smelter workers and kiosk sellers | Work experience, changes, health issues, programmes related to safety measure, alternatives to smelting |
| | Service providers and community leaders | Health risks, challenges and support to prevent lead exposure in the community, information sharing |

Analysis

Study data was analysed through an iterative process that aimed to ensure a truly mixed methods approach. This combined the survey data analysis plan framework and a grounded approach into an integrated report framework. The analysis process was undertaken jointly by the qualitative and quantitative research streams to provide integrated and complementary findings with detailed explanations and interpretations. Insights from the pFGDs, further complemented by the survey findings, were analysed into patterns and relationships by the study analysis team, including the study lead, co-leads, and technical advisor. After completing their own charting of the debriefing and archiving notes, this team came together to discuss and explore the emerging narratives and create an initial combined framework to guide the report writing. The study team leaders also used this combined framework to review the resonance within the insights, initial patterns and relationships from both quantitative and qualitative findings.

2.2 Study Locations

The study locations were selected by Vital Strategies following an in-person scoping process. The criteria used to select these locations included (i) presence of active smelters/

ULAB recycling facilities, (ii) presence of ULAB kiosks i.e. where people buy and sell ULAB, and (iii) history of contamination from past smelting activities.

The study was implemented in Tegal District, Central Java and Bogor District, West Java. In each district, the qualitative data collection was collected in a main village (1 village) selected by Vital Strategies, and the quantitative data collected from the main village along with three adjoining villages (total 4 villages).

2.3 Study Participants

During the qualitative Phases 1 and 3, researchers interacted with 140 people. Table 4 below presents an overview of these participants.

Table 4. pFGD and In-Depth Interview Participants (Phases 1 and 3)

| Location | Community Leaders (e.g. village officials, RT or RW heads) | Parents (mostly with children under 5) | Youth (including disabled youth) | Smelter workers (including ex-smelter workers) | Service Providers (e.g. teachers, midwives, puskesmas staff, cadre) |
|--------------|--|--|----------------------------------|--|---|
| Bogor | 16 | 25 | 12 | 2 | 13 |
| Tegal | 15 | 27 | 11 | 2 | 17 |
| Total | 31 | 52 | 23 | 4 | 30 |

The quantitative survey in Phase 2 included 566 households. The table below presents an overview of these participants.

Table 5. Household Survey Participants (Phase 2)

| Location | Main village | Adjacent villages | Total |
|--------------|--------------|-------------------|------------|
| Bogor | 139 | 136 | 275 |
| Tegal | 137 | 154 | 291 |
| Total | | | 566 |

2.4 Safeguarding and Ethics

This study was guided by the highest ethical standards and best practice in research ethics. This includes strict adherence to principles of informed consent, right to withdraw without

penalty, voluntary participation, do no harm and data protection and confidentiality. Ethical approval was obtained for this study from BRANY Institutional Review Board and Universitas Atma Jaya.

As part of Empatika's own best practice, all researchers were trained on principles of both ethics and people-centred research to ensure participants are comfortable and able to express themselves freely in their own spaces. Researchers ask for people's written consent to be able to use their stories and insights and assure people that they would keep their sharing off the record if they did not want something shared or did not give their consent. Verbal consent was also recorded for all survey respondents. Researchers sign a consent declaration as part of the archiving process.

All researchers were fully trained on all aspects of research ethics and child protection and signed Code of Conduct on Confidentiality, Data Protection and Child Protection Policy declarations as part of their contracts (see Annex 2 for more information on the study team). All data (written and visual) is coded to protect the identity of individuals and communities. As a result, the exact locations and identities of study participants and others are not revealed in this report.

2.5 Study Limitations

The findings of this study have some limitations. First, this study explores people's knowledge, attitude, and practice related to prevention of lead exposure in areas specifically located near ULAB recycling facilities that placed communities at higher risk of lead exposure. Therefore, the findings are limited to the views of people living there rather than the wider population. Furthermore, the pFGDs in this study focus on the main village where there used to be smelting activities and may not represent people's views in the adjoining villages. While the survey results between the main and adjoining villages did not show significant differences, the level of detail provided by the pFGDs is only available for the main villages. Additionally, adult women were the primary respondent group included in the survey as this was the group primarily available during survey administration. Although this may induce a certain level of bias and privilege the views of women, adult men were specifically included in the pFGDs in order to ensure the study overall presented balanced views.



Findings

3. Findings

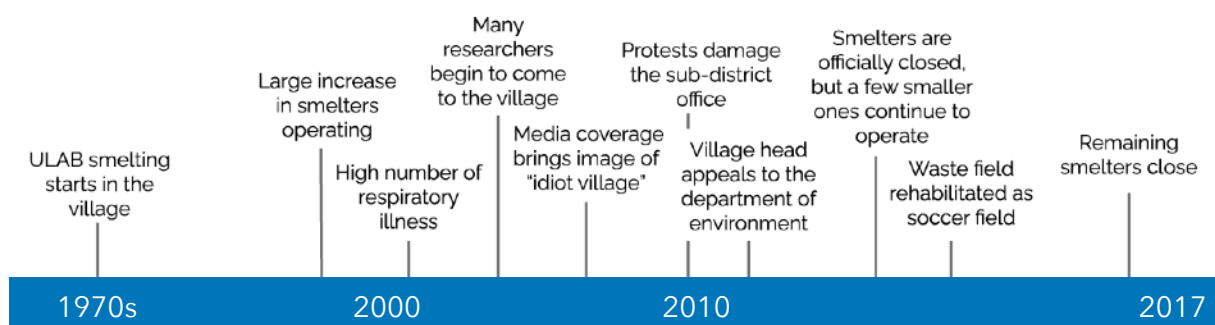
This section provides analysis of findings from the two study locations, Bogor and Tegal, including data collected from qualitative (pFGD and in-depth interview) and quantitative (household survey) methods. It will start with **context** to contextualise the findings and to provide details on the two districts where the study was implemented. The following sections are people’s **attitude, knowledge, and practice** detailing each theme related to lead exposure. The analysis starts with attitude as it serves as an underlying theme of how people perceive risks of lead exposure, and it contextualises the discussion of people’s knowledge and practice. Then, a section on **sources of information** explains how people access information including for health. Drawing on these findings, the last section on **developing communication for behaviour change** will describe some entry points that can be used to develop messages or other interventions.

3.1 Context

Bogor

Bogor village is a large, peri urban village with around 12,000 people located approximately 1 hour drive from the city of Bogor with paved road access. The community is surrounded by rice fields and vegetable gardens; many people in the village grow rice for their own consumption. People primarily work as local farm labourers, food and snack sellers who typically leave the village each day to go work closer to Jakarta, vegetable farmers, construction and factory labourers, along with some civil servants.

Graphic 2. ULAB smelting history in Bogor



Brief timeline of ULAB smelting history in Bogor village.

The community was known for its long history with used lead acid battery (ULAB) smelting dating back to the 1970s. While in the early years only a few smelters were in operation, by 2010 this had grown to around 110 smelters operating in the community. Most of the ULAB smelting was done in one RW out of the 10 RWs, with around half of the families living in this RW involved in smelting work. Waste from the smelters was primarily dumped on a field

across from the current village office, as well as on an embankment near the local river. People present at the time noted there was often heavy smoke in the village, particularly at night, due to the smelters. One *posyandu* cadre said this smoke was “prevalent for years” back then. Graphic 2 provides a timeline of the smelting history in Bogor village. Along with the smoke, people also described problems with water in some parts of the community that continue through today.

While some of the environmental impacts may have been harder for people to pinpoint or correlate with the smelting, the increasing number of smelters led to a high incidence of respiratory illness. As a result, the community was increasingly visited by researchers, and eventually garnered attention from the media. Media coverage highlighted not only the smoke and respiratory issues, but eventually also the high number of children with disabilities in the community. According to some community members, the area became known as the one with “idiot children.” The increasing attention paid to this issue appears to have triggered community resentment to the presence of the smelters, which until this point had not been the topic of public discussion. This resentment came to a head during 2010 protests, during which the sub-district office was damaged although this had not led to any immediate action. Eventually, not long after this the district environmental office made the decision to close the smelters. However, people told us that some smaller smelters continued to operate despite the closure, with these finally closed down in 2017.

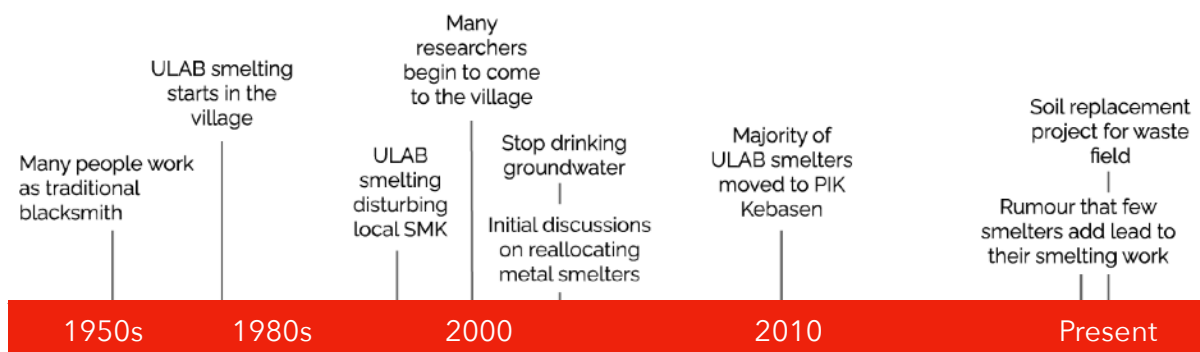
Many of those who had worked in the smelters became farm labourers and food sellers, although some had difficulty transitioning or finding work and remained unemployed. Some people said the closures had created some tension in the community due to the number of people that had been involved in, or depended on, smelting work and others who opposed the smelters. Daily wages for working in the ULAB smelters was said to be double that of working as a farm labourer or an informal seller. Soon after the majority of the ULAB smelters were closed, a project from the district environmental office rehabilitated the field across from the village office. Waste was collected in sacks and buried, and the field was turned into a soccer field.

Tegal

The community in Tegal village is a large community with around 12,000 residents. It is a periurban community around 20 minutes from the small cities of Tegal and Slawi. The area is densely populated with houses coupled along small alleys and has the feeling of a big city neighbourhood. The village has paved road access and has easy access to nearby public services e.g. health providers, schools.

Compared to Bogor village, past smelting work in Tegal village was done primarily at the household level. The community has a long history of blacksmith and home industry, with less than 1% of families said to be farmers. A small number of people work outside of the village. Beginning in the 1980's, more traditional blacksmithing gave way to ULAB and aluminium smelting for many households. ULAB smelting was done in two RWs, including

Graphic 3. ULAB smelting history in Tegal



Brief timeline of ULAB smelting history in Tegal village.

both smaller household operations and some larger ULAB smelters. Aluminium smelting and forging, where previously used aluminium products are smelted to create kitchen goods like pans, stove parts, and motorbike exhaust pipes, is currently done throughout the community.



Many work as aluminum or metal workers in Tegal village who smelt recycled aluminum to produce other household products and vehicle parts.

People in some areas also smelt and forge other metals and minerals to produce products such as iron plates. Some people described their community as “like Japan in Indonesia,” in that the whole village is skilled and produces products. The graphic below illustrates the timeline of smelting history in Tegal village.

With ULAB smelting, battery water waste was dumped behind people’s homes or into the sewers, while ashes



A common sight around Tegal village, collected old parts in a workshop are ready for potential recycling or smelting.

were dumped in a field near a vocational high school in the community. Ashes from other smelting, such as aluminium, were also dumped in this field.

Similar to Bogor village, the situation in the Tegal community began to change around the year 2000. The vice *bupati* (district regent) at the time owned the vocational high school (Sekolah Menengah Kejuruan, SMK) located nearby some of the ULAB smelters along with the field used for waste. Smoke and noise from the smelters were disturbing the school, and seemed to be polluting nearby water. To protect his school, the vice *bupati* began to design plans for a dedicated area where smelting work could be done away from the community. Around this same time, researchers began to visit the community. Assessments of the water in the neighbourhood close to where ULAB smelting was done showed high levels of lead contamination although many were not aware of this. Since this time, no one in the community has used groundwater for drinking though most people said this shift was due to the bad taste and smell of the water, rather than the results of the assessment. *Puskesmas* staff here told us that research carried out around 5 years ago indicated that fruits and vegetables grown in the village should not be consumed. Still, people in the community were less sure about this, especially in neighbourhoods further away from the primary ULAB smelting areas. Some people said they heard that they shouldn't eat bananas grown in their area, but others noted that the plants in their area are greener (and thus should be edible), not yellow like some of those closer to the ULAB smelting.

The vice *bupati's* plans eventually resulted in a *Perkampungan Industri Kecil* (PIK), small industry village, on land owned by the vice *bupati* near a neighbouring village. The larger scale metal workers including those doing ULAB smelting were told they would need to move their operations to PIK under one condition that they were not allowed to do ULAB smelting there; village officials also encouraged people to stop ULAB smelting in the village. It took years (until 2010) to establish the PIK. People told us that the transition to the PIK was not smooth as some said they were given work space there for free, while others needed to pay for space. Some shared that they were not comfortable working there after instances where equipment was stolen from their workshop, and others said they did not like needing to travel 10 minutes to PIK. These workers sold their space in PIK and resumed metal smelting in the village. Along with smelting activities, the PIK also has a larger company based there which makes bricks using waste from metal smelters.

A Danish organisation is currently funding a soil replacement project for the waste field. People told us that the plan is to collect the contaminated soil and mix it with other materials to produce bricks, although these will be produced outside of the community.

Summary of Key Findings

Only **28%** respondents in Bogor and **43%** respondents **have heard about lead**

Those who have heard about lead and can describe it mainly define lead as a visible material (waste, metal). Most people are more familiar with ULAB smelting and ULAB battery water compared to lead.

65%

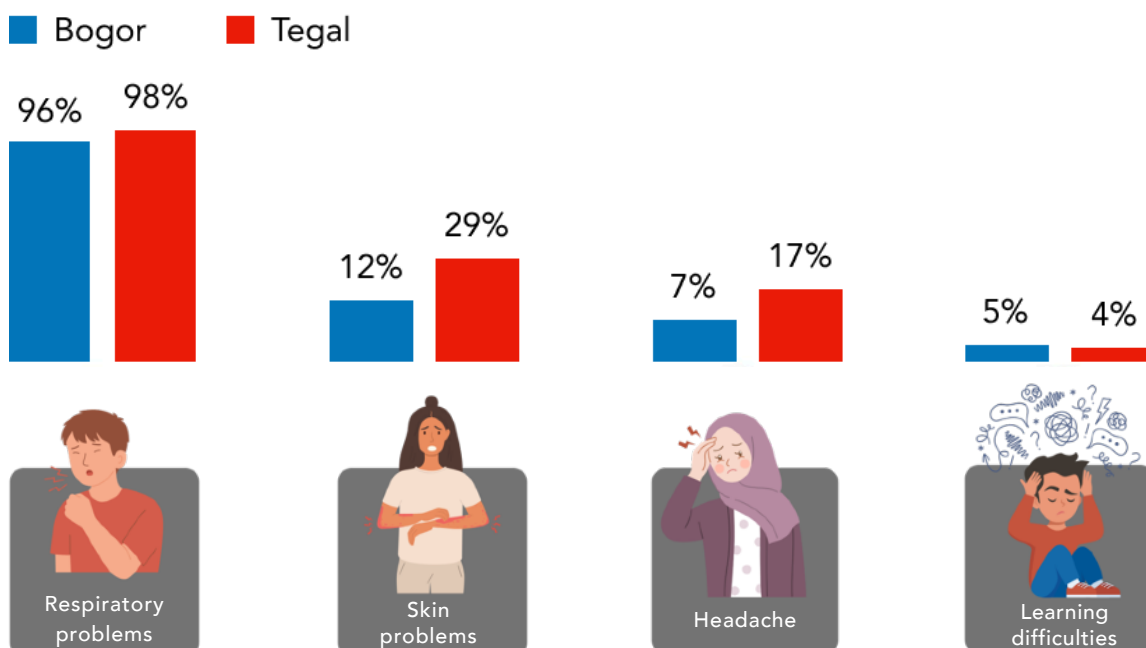
of respondents in Bogor said they were 'not worried at all' or 'worried in the past' because ULAB smelting has discontinued in their area

52%

of respondents in Tegal were 'worried' or 'very worried' about ULAB smelting with many saying lead from smelting activity is poisonous

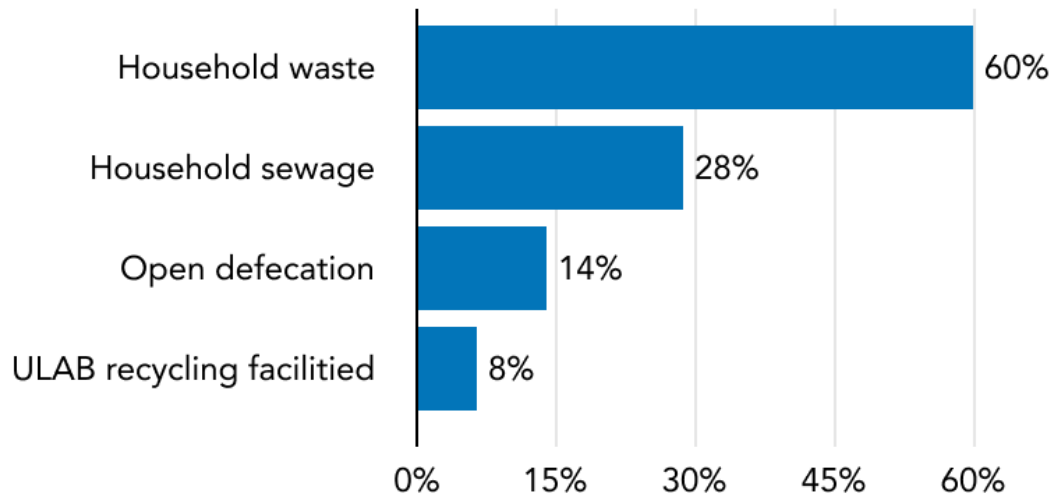
83% of respondents in each Bogor and Tegal think ULAB smelting has health effects

Respondents identified some health effects from ULAB smelting, with majority think respiratory problems as the main effect

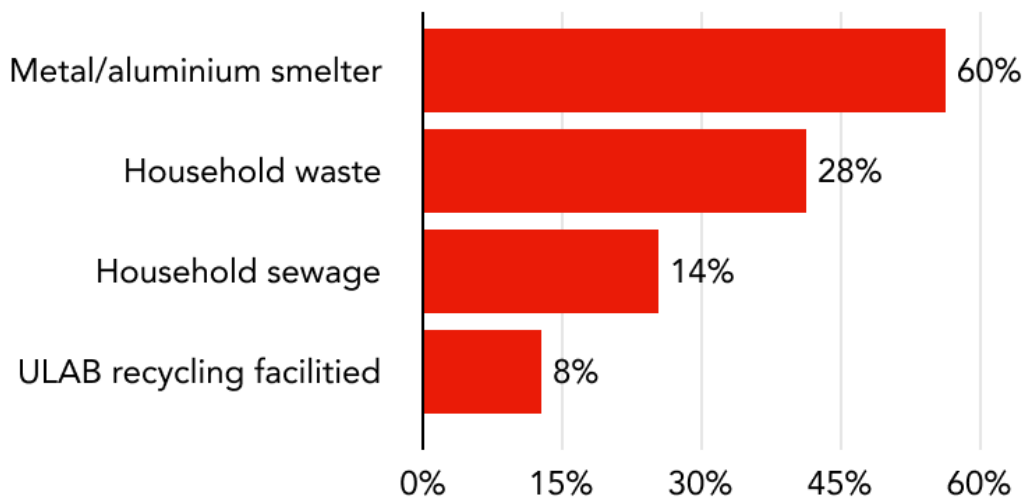


People think other sources of pollutants are more concerning to them compared to ULAB recycling. **60% of respondents in Bogor** were concerned about household waste, while **53% in Tegal** were concerned about the aluminium smelting.

Bogor



Tegal



3.2 Attitude - perceived risks from ULAB smelting

This section begins by exploring people's views on health risks, what concerns them and sources of pollutants. This is followed by people's views on ULAB smelting risks. Key findings on these topics include:

- People tend to perceive risks from materials that can be observed and give direct or immediate effects, including black smoke and contaminated water. In relation to ULAB smelting, health risk is strongly associated with prevalent thick, black smoke from the smelters. As ULAB smelting activities stopped and there is no more black smoke, people no longer perceive health risks from ULAB smelting.
- Relatively small proportions of people consider ULAB smelting to be a primary source of pollutants now that smelting activities have ended in both Bogor and Tegal. Even in the past when ULAB smelting was still active, people did not consider these to have long-term health effects and smoke to be risky as they could alleviate the impacts and they considered the risks isolated to certain neighbourhoods.
- Most people in Bogor and Tegal identify respiratory problems as the main health consequence of smelting. They did not feel they had experienced any long term effects from ULAB smelting.
- People identified changes in their environment e.g. groundwater changing taste or smell, but did not necessarily associate these with ULAB smelting and did not consider them to be dangerous for their health.
- Many people in Tegal cited metal/aluminum smelting as the primary source of pollution nowadays and they were mainly worried the smoke will cause respiratory problems or eye irritation.
- In Bogor, people were primarily concerned about household waste, which people say has polluted the river and caused diarrhoea in children. This is considered more risky than ULAB smelting or waste.

Health risks that concern people

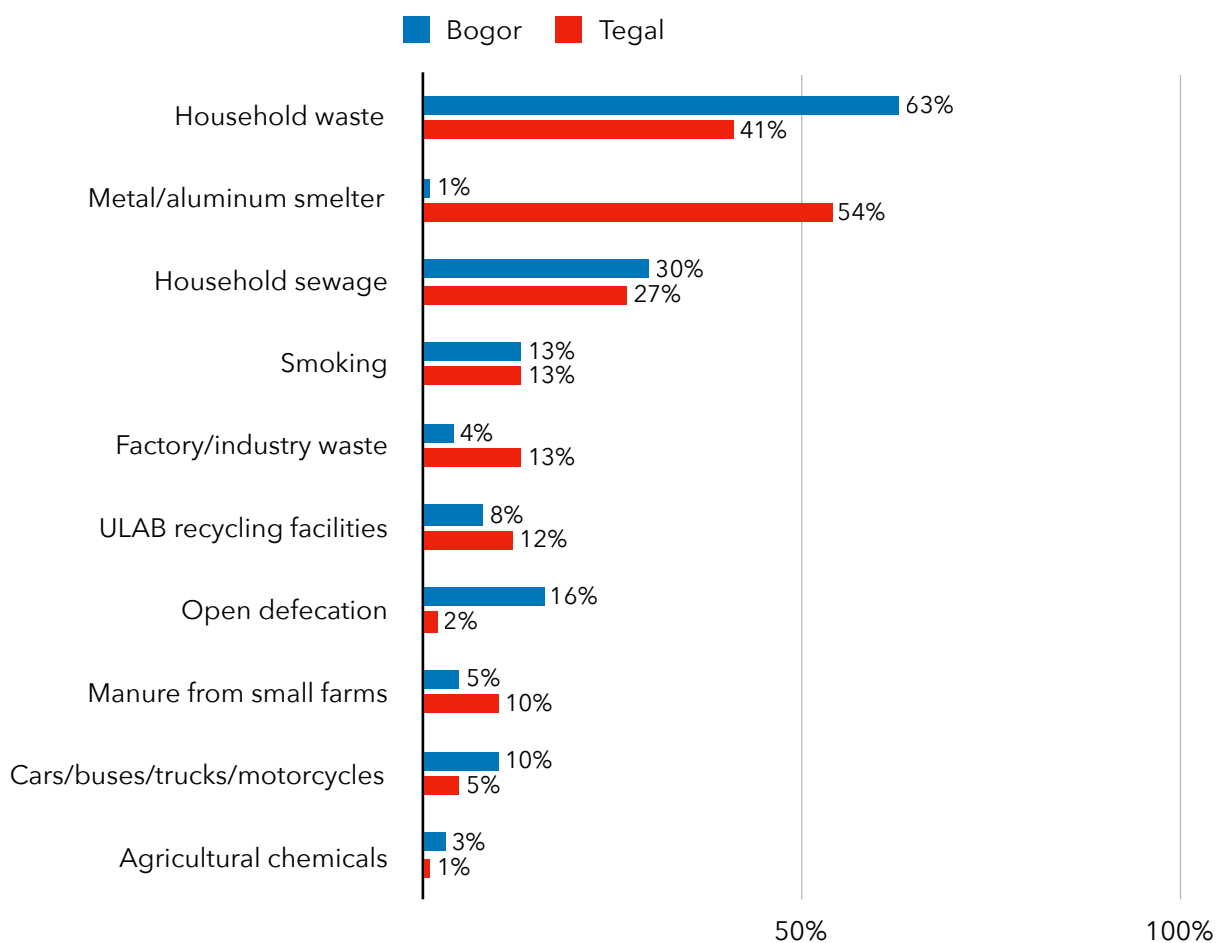
Views on sources of pollutants

Views on the most common sources of pollutants varied by area. Though **in both locations relatively small proportions of respondents cited ULAB recycling as a primary source of pollutants** (Bogor - 8%, Tegal - 12%), in Tegal, metal/aluminium smelting was most commonly identified as a source of pollutants in the area (54%). This was then followed by household waste as another significant source of pollution in Tegal (41%). In Bogor village, household waste (63%) and waste in the sewer or river (30%) were identified as the primary

sources of pollution in that area. The emphasis on household waste as a pollutant in Bogor is consistent with pFGD discussions in Bogor village, where the majority of participants mentioned household waste as their top risk. They also noted that some households, especially those who cannot afford to build toilets in their houses, use the river for sanitation and hygiene purposes, including open defecation (16%).

Graphic 4. In your opinion, what are the sources of pollutants in your area?

(multiple responses)



Levels of concern related to pollutants

Concerns about other sources of pollutants differ for people in Bogor and Tegal with many people in Bogor are more concerned about household waste while in Tegal, people were worried about aluminium smelting.

In Bogor village, the pFGD groups noted that there is currently no waste management system in place for the village, with some RTs or RWs arranging trash pick up for a fee while in other neighbourhoods people will just burn their trash. There have been campaigns from the *puskesmas* in the community about keeping the river clean by not throwing trash and not using it for sanitation and hygiene activities, yet people continue to do so. People explained that they know the river is polluted because the water is brown and smelly,



Photo by Empatika team

| The river in Bogor village.

compared to 30-50 years ago when the water was considered good and could be used for household consumption. **Other than it becoming no longer available for consumption, people felt the polluted river has some health risks such as children getting diarrhoea from playing in the river and dengue fever.** Some parents told us that when the river dries up during the dry season, trash and diapers pile up and create breeding sites for mosquitoes which can infect children with dengue.

Mothers and cadres in Bogor also shared in the pFGDs their **concerns about cigarette smoke** especially among those who have children under 5; from the survey, 13% of the respondents identified cigarette smoke as a concerning pollutant. Many of their husbands smoke, so when at home they pose health risks

for other family members. As part of the *posyandu* programme, cadres have encouraged mothers to remind their husbands about keeping distance from their children when smoking. Mothers say they have done this and it has helped to reduce health risks from the smoke.

While in both locations relatively few people are worried about ULAB smelting as a source of pollutants given that ULAB smelting has stopped, **over half the respondents in Tegal are concerned about aluminium smelting.** The survey shows **people in Tegal actually perceive a higher risk from the smoke of aluminium smelting (53%)** compared to ULAB smelting (20%). The Bogor village result shows the opposite, where the majority of people (65%) think smoke from ULAB smelting (from the past) is



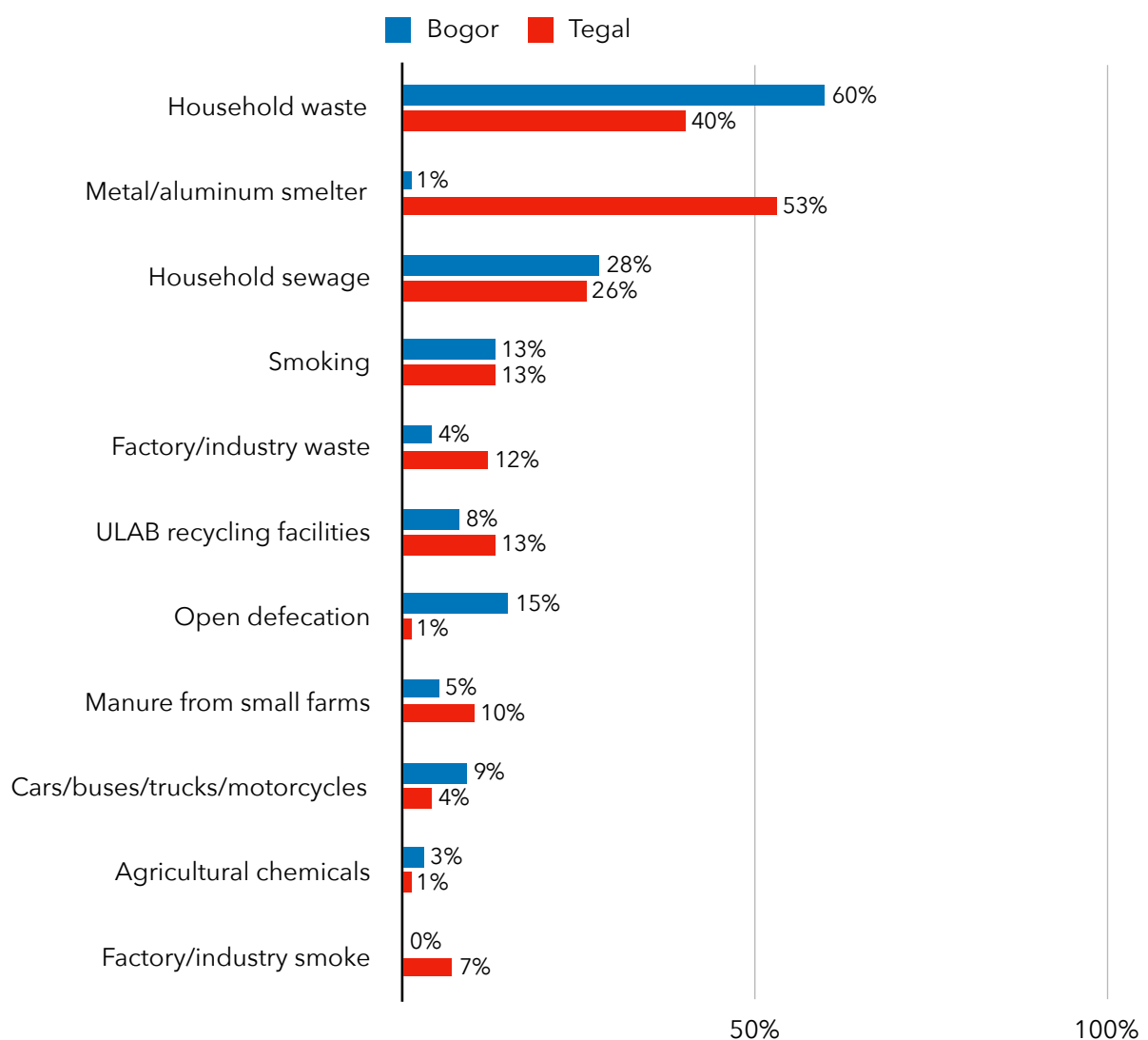
Photo by Empatika team

| A man in Tegal village prepares to do aluminum smelting.

the most dangerous. This might indicate that people perceive risks based on more recent experience or currently evident activities such as the ongoing aluminium smelting in Tegal, compared to Bogor where there is no smelting of any kind.

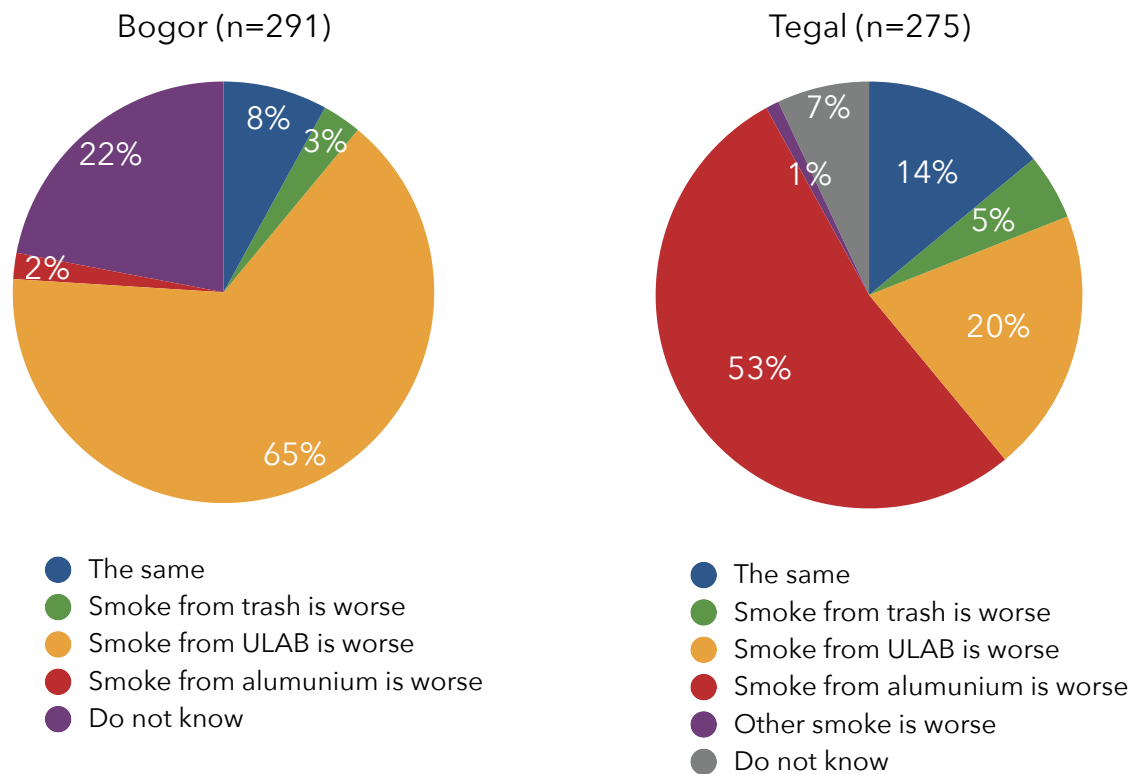
Graphic 5. Which of the above sources of pollution ____ worries you?
(multiple responses)

Blacksmithing is actually a long time practice in the village, but people are worried as they have heard that in recent years smelters are adding more chemical substances in the smelting process. A few fathers are even suspicious that some aluminium smelters add “*timah*” (lead) from used batteries in the melting process to make the metal more moldable.



Their concerns about aluminium smelting are similar to those they had in the past when ULAB smelting was widespread, that the **smoke will cause respiratory problems or eye irritation.**

Graphic 6. Do you think smoke from smelting or burning trash, ULAB, aluminium have the same effect?



While people in the Tegal pFGDs do not talk much about household waste, they are concerned about **river pollution which is mainly from local tofu factories and hospital waste**. This has been a long-term problem and people have protested to the tofu factory, but there seems to be no action taken yet to mitigate the waste. Most people are very aware of the black coloured river water and the strong smell coming from the river; some parents also say that children cannot play in the river like they used to in the past when the river was clean. **People, however, do not associate the polluted river with health risks but rather to consequent practical things they cannot do:** they can no longer use the water for consumption like in the past due to bad taste and smell, and cannot wash their clothes with river water as it will ruin their laundry.



The river next to Tegal village.

People's views of ULAB smelting risks

People in both locations no longer consider ULAB smelting to be a health risk because there are no more ULAB smelting activities. This response appears in the pFGDs and household survey with many referring to the closure of ULAB smelters in Bogor and Tegal villages in the 2010s leading to a significant decrease of smoke. Consequently, there are almost no respiratory problems and therefore people associate no more risks from ULAB smelting. People recall that they used to see smoke from ULAB smelting during the day (Tegal) or evening (Bogor) and experienced respiratory problems. People in Tegal added that the smoke was worse during a cloudy day because it lingered in the village and made it even harder to breathe. However, they no longer experience this since ULAB smelter closures in the 2010s. Many adults that we meet in Bogor said that in the past they and their children experienced coughing, shortness of breath, and in some severe cases "lung spots" that required 6 – 12 months treatment. Compared to adults, youth said they were aware of the consequences of inhaling the smoke such as sore throat, but did not know it was harmful at that time. Concerns among the few people who still worry about this appear to be driven by continuous research about lead in their area, which they think might indicate ongoing problems.

Even in the past when ULAB smelting was still active, people did not consider the smoke to be a major risk as they could alleviate the impact. For instance, people in Tegal said they would drink water when they got a sore throat from the smoke while families in Bogor would cover their home's ventilation and close windows to prevent smoke getting into the house. If they experienced more severe effects such as "lung spots" which people say are diagnosed through an X-ray check, they would visit health providers and get



Photo by Empatika team

| People typically perceived the biggest issues with smelting to be the smoke, dust, and noise as these were easily noticed and affected their daily lives.

treatment. The income earning opportunity from ULAB smelting, which was typically better than other work available in the area, seemed to influence this accepting attitude. Some people in Tegal shared that they did not want to complain about their neighbours working on the smelting because it was their livelihood and they did not want to cause any disruption. Even when the work caused illness, people dealt with the risks as they came. A former smelter worker in Bogor explained that he had this dilemma when his infant child had lung disease from smoke in the village and had to be treated for one year. The father decided to continue working in the smelter and continued to live in the village with his child despite knowing the risk of ULAB smelting smoke.

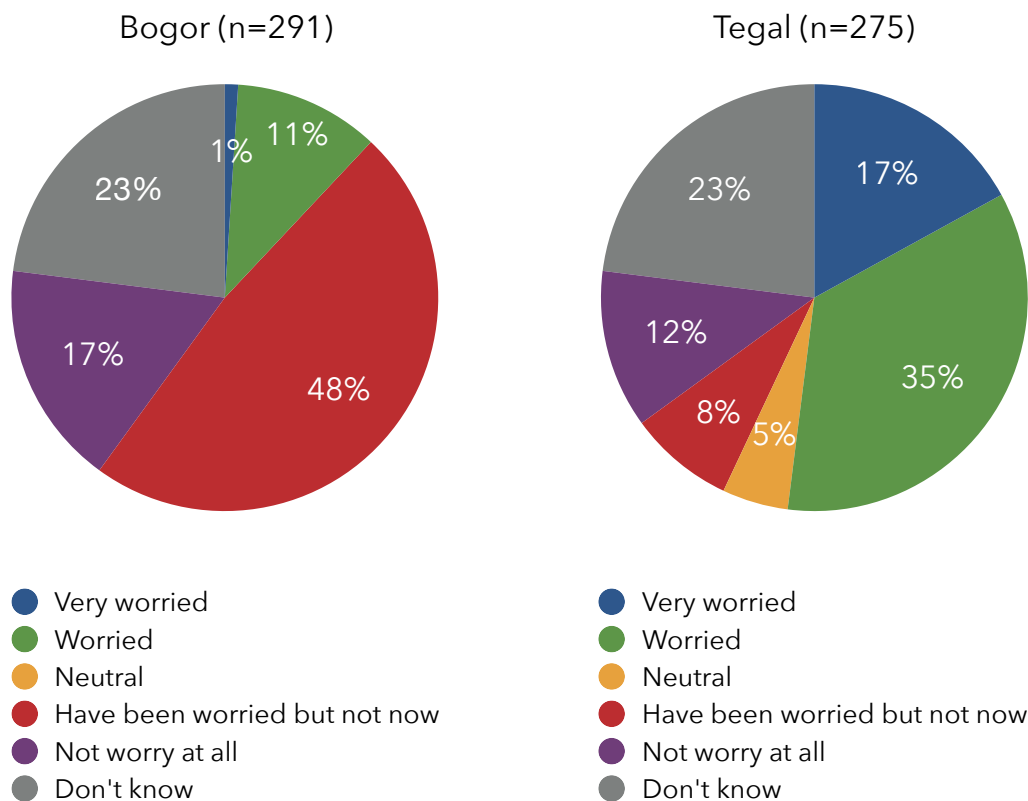
"If there were smelters now this would be top concern, but they are not here anymore... now at the bottom of the list [of health risks]"

| pFGD with mothers in Bogor

In Tegal, since the district government relocated large metal smelters from the village to a nearby industrial complex, fewer metal smelters operate in the village, leading to a reduction in smoke produced in the village. People consider the reduced level of smoke to be an improvement and generally do not consider it to be harmful to their health. Some even said they have gotten used to the smoke, given the long history of blacksmithing in the area. One father who joined a pFGD explained that when he moved into Tegal in 1995 and noticed children having breathing difficulties, others dismissed him as simply not being used to the smoke yet.

The survey highlights different views between the two locations related to the perceived risk of ULAB smelting. **In Bogor, the majority of respondents described themselves as either 'not worried' or 'worried in the past'** (total 65%), citing the discontinuation of smelting in the area as the main rationale for this view. In contrast, higher proportions of respondents **in Tegal** continue to worry about this risk, with 52% describing themselves as **'worried' or 'very worried' about ULAB smelting**, with many saying that lead from smelting is poisonous. While ULAB smelting has stopped in Tegal, there are still other metal smelters operating. This contrasts with Bogor, where there are no more smelting activities, ULAB or otherwise. Given that a majority of people in Tegal perceive risk from the smoke of aluminium smelting as mentioned above, we believe this apparent concern about ULAB smelting may relate to aluminium smelting and the reality that smoke is still a regular occurrence in the village. It may also reflect the more recent rumours about lead potentially being used in the aluminium smelting process.

Graphic 7. We heard about ULAB smelting activity here or near your village. How concerned are you now about the presence of ULAB smelting?

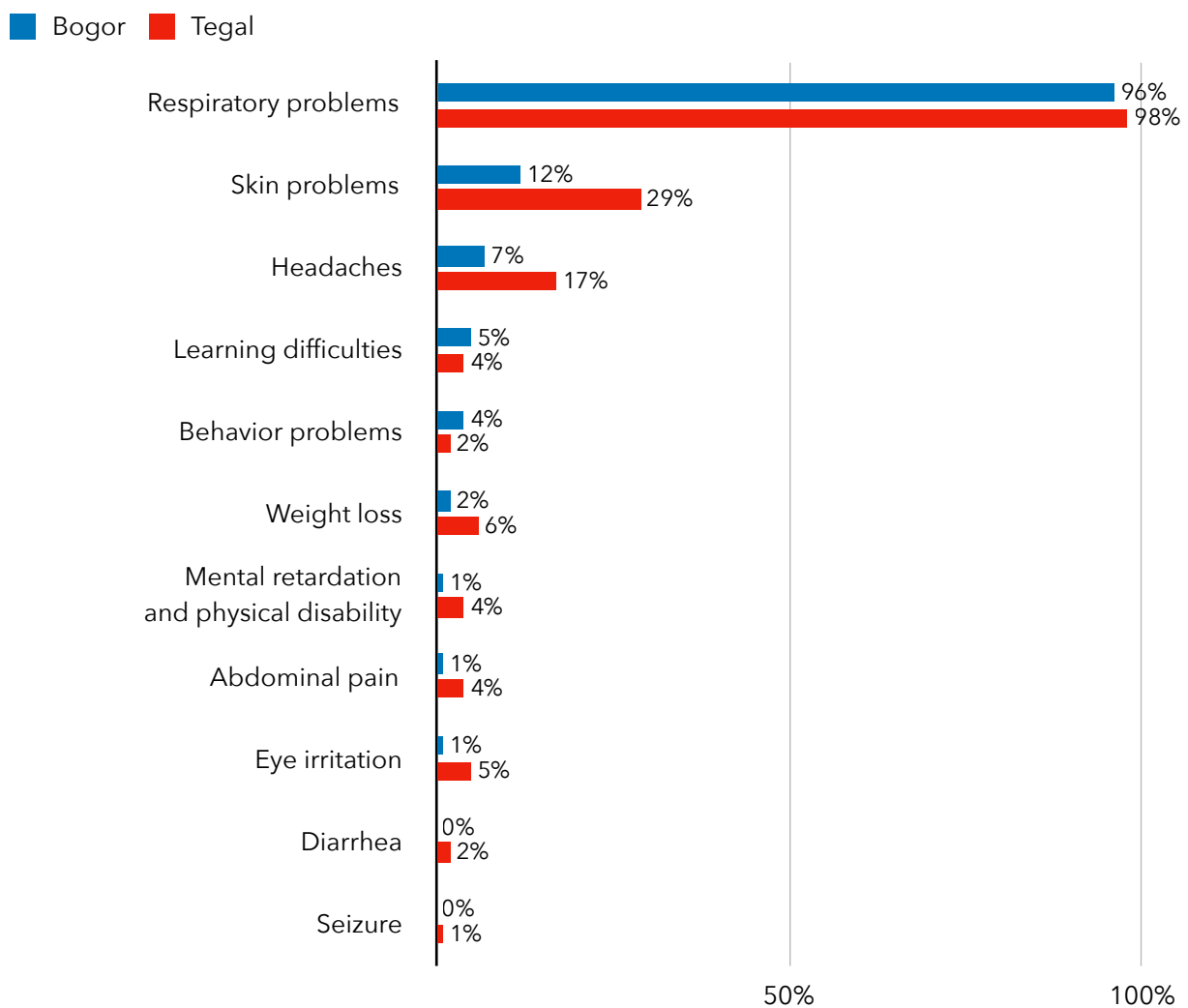


Risks from ULAB smelting are also considered isolated to certain neighbourhoods (RT or RW) as smelting activities were usually centralised in a few locations. People in both locations spoke about community members from the 'smelting area' who passed away prematurely, and in Tegal some people noted that more men living there are paralysed or prone to stroke while children are shorter and are more vulnerable to ailments compared to children in other areas of the village. Others in Tegal did not feel they were affected by ULAB smelting because smelting was not done in their neighbourhood. People also interpreted the yellow plants in the ULAB smelting area as an indication that this area was unsafe, as compared to the green plants that grew in their neighbourhood, citing rumours that fruit grown in the ULAB smelting area should not be consumed, with some hearing rumours that plants and fruits from there are not edible. Some community leaders explained this difference is due to lead contamination that makes the soil barren, while others were not sure why and continue consuming the fruit grown there. However, in Bogor more plants have now grown around the smelting area since the land was rehabilitated and people thought of this as a sign of improvement.

Along with the mindset that the health risks of ULAB smelting can be treated, **people did not feel they had experienced any long term effects from smelting.** People in the pFGDs held differing views about the possibility that ULAB smelting can cause long term effects, particularly related to mental disability among children. Across the study locations, those

who are more informed about the long term effects are usually the community leaders such as village officials and local health providers. When there were still many ULAB smelters in Bogor, some village officials recall that there was an international organisation conducting cognitive tests for children from which 12 children were found to have mental disability related to lead exposure. These village officials **were not certain that the disability was caused by ULAB smelting, however, and thought it was probably hereditary**, a view that many parents also shared. Some mothers and cadres told us that mental disability is more likely to be inherited as most people they know who worked in the ULAB smelting as well as their family members have always been healthy. This is similar to Tegal where there were many cases of children with mental disabilities, but people did not necessarily associate this with ULAB smelting or lead exposure except for the head of a local NGO. Given his work on health issues, this man was aware of ULAB smelting impacts and was certain that the children there were affected by it.

Graphic 8. What are the health effects from ULAB smelting?
(multiple responses)



Community leaders in Tegal were also more informed about the effects of ULAB smelting on children's cognitive and neurological development as compared to other members of the community. One community leader commented that although there is a family whose children all have mental disabilities, most people are "slow to understand" the effects of ULAB smelting or other smelting on child development. He highlighted this, noting that some people were hesitant to move their smelting operations to the PIK, and some of the largest smelting operators only did so after some persuasion from the head of a local NGO. However, some parents told us that they had concluded that smelting had long term health consequences after observing the families of smelting workers – some of their children have developmental challenges and are shorter than other kids, and some of the smelter workers passed away before age 60 or had nerve impairment/paralysis.

Although some people link these severe health effects with ULAB smelting, the survey results find that **nearly all respondents identify respiratory problems as the main health consequence of ULAB smelting** in both locations. This is linked to people's strong association between inhaling ULAB smelting smoke and its health risk. In both locations, skin problems were the next most commonly cited health effect, followed by headaches. Notably, very few respondents (3-5%) in either location identified smelting as having negative impacts on cognitive or physical development.

We observed that ULAB smelting waste was present in both locations, however most people did not consider this to be a problem. Smelting waste in the form of small rocks could be seen on the roadside in Bogor, which people used to decorate their gardens. Those living here said they are aware that waste sacks from the smelters which had originally been buried underground have been exposed by erosion, but did not consider this to be a problem. Youth talked about the waste sacks that are visible on and around the soccer field and use them as chairs to sit on while hanging out there. They do not think the waste poses any harm to them. In Tegal, past ULAB smelters also used to dump and bury their waste on



In Bogor, some people used small rocks of ULAB waste as decoration in their garden around the home.

a field in the village and the waste is still present there now. Some parents who are more informed about the danger of ULAB waste do not allow their children to play near this field, which is being rehabilitated, though we observed children playing there. Other families said that some people use smelting waste as material for road or house construction.

While people identified changes in their environment, they did not necessarily associate these changes with ULAB smelting. One of the notable changes is related to groundwater. In both locations, people describe the groundwater from wells as having a bitter taste (Tegal), a bad smell (Bogor and Tegal), being yellowish in colour (Bogor), or being covered by a thin, coloured layer after it is boiled (Tegal). **People commonly do not associate this with ULAB smelting and rather blame the water source as the problem. In addition, most people did not consider this water to be dangerous for their health, though they said they avoid consuming it because of its unpleasant taste and smell.** Mothers in Bogor spoke about a well near a former smelter workshop that has yellowish water; but because other wells nearby had clear water they did not relate the yellowish water to ULAB smelting activities. Some village officials here explained that previous research in the area found their groundwater is not safe for drinking, but they still think it is safe as long as they boil it or remove the sediment by leaving it overnight. People in Tegal had similar views, and complained that they now need to buy water for home use because the groundwater tastes and smells bad, and will stain their clothes if used for laundry. However, here they still use groundwater for bathing and brushing their teeth and do not think the water is dangerous for their health. People are not sure what causes the water to change and they do not see this in relation to ULAB smelting nor do they see any health risks from this water.



Photo by Empatika team

| Exposed sacks of ULAB smelting waste in Bogor village. Some vegetables and fruit plants grow on the soil where these sacks were buried, and people said they can consume them.

3.3 Knowledge - what people know about lead

This section discusses people's understanding of lead, including what it is, sources of lead, and associated health risks. Some of these findings recall findings mentioned in the attitudes section, given that knowledge and attitude are often intertwined. Key findings related to people's knowledge about lead are:

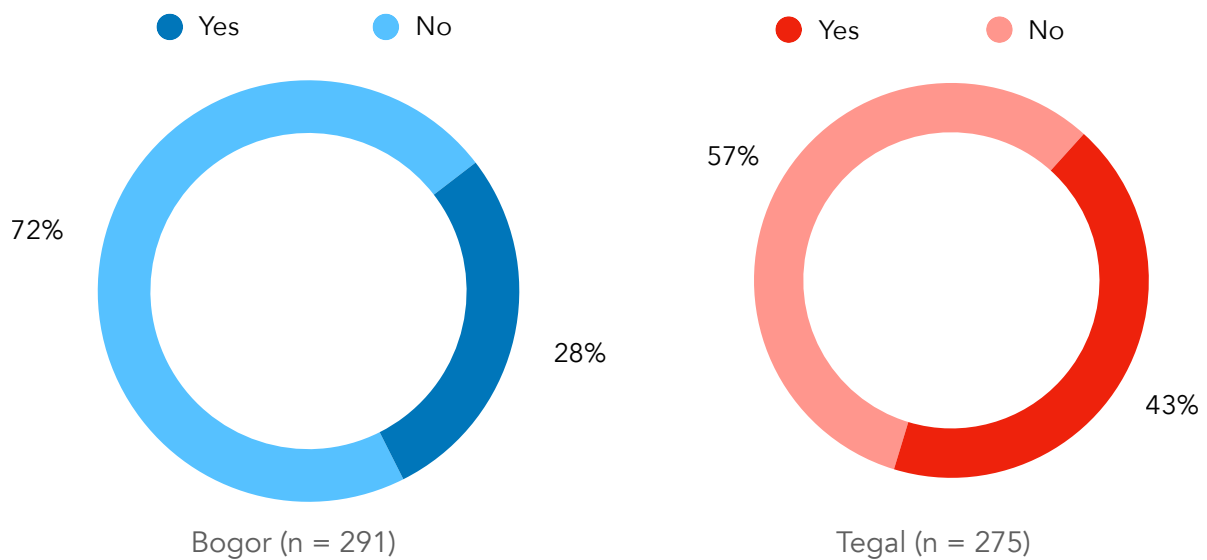
- Most people are familiar with ULAB smelting and ULAB battery water but are not familiar with lead. Those who have heard about lead and can describe it mainly define lead as a visible material (waste, metal).
- People who are more familiar with lead are typically those who have joined specific activities designed to inform them about lead e.g. community leaders or representatives.
- The majority of people did not know the level of lead exposure in their area, nor were they aware of possible sources of lead exposure.
- People view the primary risk associated with ULAB smelting to be the presence of black smoke, and do not consider lead exposure through other sources such as smelting waste and contaminated water.
- The majority of respondents considered ULAB smelting to have a negative health impact on people with most citing respiratory problems resulting from the smoke as the main health effects.
- There is little knowledge about long-term effects from ULAB smelting and few people were aware that ULAB smelting or lead can lead to developmental, cognitive or behavioural challenges.
- Most people are not aware of any health programme or promotion related to lead in their communities, including any research dissemination although people commonly refer to multiple studies done in the villages over that past years.

Most people in both study locations were familiar with ULAB smelting (*peleburan* or *pembakaran aki bekas*), **but not lead** (*timbal*). The majority of respondents said they had never heard "about lead" (72% in Bogor and 57% in Tegal). Among those who had heard of lead, around 30% were not certain what it was.

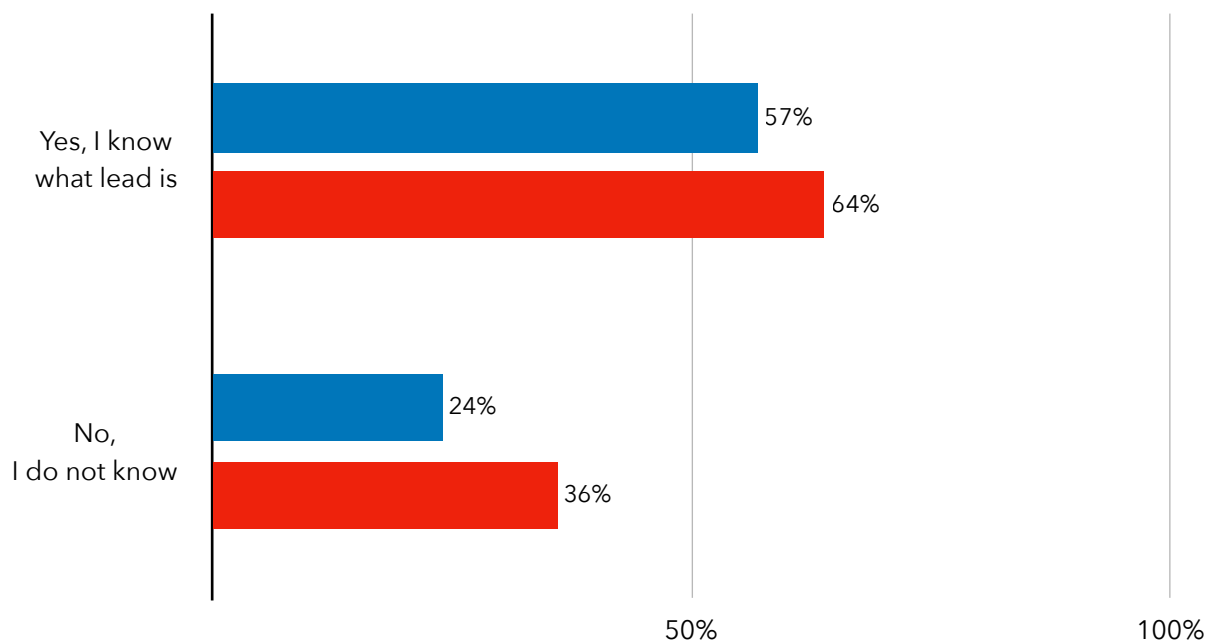
Respondents who have heard about lead and can describe it mainly define lead as a visible material. Among those who knew lead in Bogor and Tegal villages, their answer included waste from smelting batteries, hazardous toxic metal waste, or a *metal* similar to iron or tin (*timah*, which is also translated as lead). This inclination to see lead in a visible form was exemplified in the pFGD in Tegal, where a father asked a researcher about a thin layer on water surface after being boiled, "Is it lead?". People's sense of lead as a visible

material is similar to people's attitude in relation to ULAB smelting risks, where people associate the risk with being able to see black smoke in the village. They are aware that smoke from ULAB smelting is different from other kinds of metal smelting, but do not know about lead in the smoke or risks other than respiratory problems.

Graphic 9. Have you ever heard about lead?



If yes, do you know what lead is?

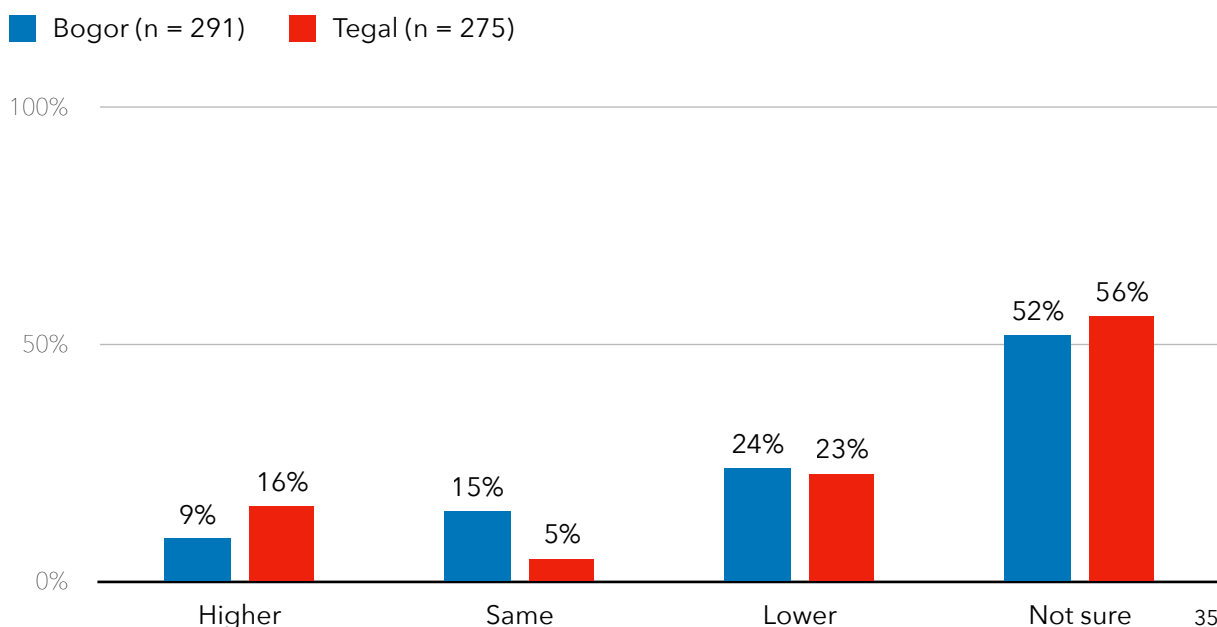


Based on Empatika’s interaction in the field, **people who are more familiar with lead are typically those who have joined specific activities designed to inform them about lead.** This often took the form of ‘socialisation’ (information session) meetings where only community leaders or representatives are typically invited including village officials, community leaders (RT or RW heads), health providers (*Puskesmas* staff, cadres), and local NGO staff. For instance, the village secretary in Tegal knows about lead contamination levels around the smelting area, and few cadres and community leaders describe lead as a substance that is part of ULAB smelting although they are not always certain what lead is. Mothers and youth however do not talk about lead and, like most people, are more familiar with ULAB smelting.

People are more familiar with ULAB battery water and its risks rather than lead. Some fathers in Bogor, including former ULAB smelting workers, explained that battery water from the used batteries contains sulphuric acid and can cause itchiness or blister if it touches skin, and even be deadly if consumed. Some village officials and community leaders in Tegal think the battery water is dangerous, but lead is not. They say *timbang* (lead) and *timah* (tin or lead) are the same thing with different names, both are in solid form and not dangerous. When smelters burn parts of ULAB, there might be residual battery water on the lead which, when burned, makes the smoke dangerous and can cause respiratory problems. Some people in Tegal also noted that battery water thrown away on the ground is dangerous because it will be absorbed and pollute the groundwater.

With little understanding about lead, the majority of people did not know the level of lead exposure in their area, nor were they aware of possible sources of lead exposure. More than half of the respondents in both Bogor and Tegal were ‘not sure’ how their community is affected by lead exposure, followed by around 20% in both locations who considered their community exposure to be ‘lower’ than neighbouring communities.

Graphic 10. Do you think your community has ... level of lead exposure compared to neighbouring communities?



There might be a disconnection between lead and ULAB smelting when the above result is compared to how people perceive risk from ULAB smelting. When asked about their concern related to the smelting, people seem to be more certain in assessing the risks with half of respondents in Tegal are worried/very worried about the smelting, while more than half of respondents in Bogor were not worried anymore now (see more Attitude).

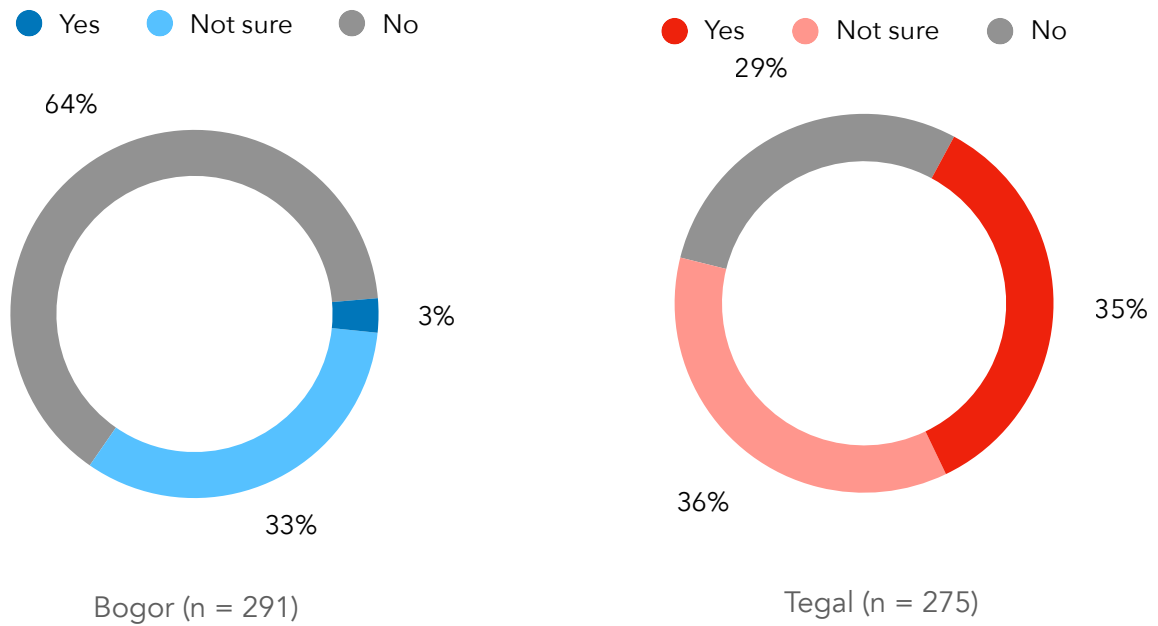
The majority of people are not aware of sources of lead other than ULAB smelters across the study locations. This was particularly low in Bogor, where only 3% of respondents said they were aware of these other lead sources, citing food, aluminium smelting, drinking water and plumbing. Comparatively more respondents in Tegal (35%) were aware of sources of lead other than ULAB smelters, nearly universally referring to aluminium smelting. As noted, people in Tegal were worried about smoke from aluminium smelting and in the present considered it as more dangerous than ULAB smelting (see Attitude).

While people were not familiar with lead, **the majority of respondents considered ULAB smelting to have negative health impacts.** The survey found 83% of respondents in Bogor and Tegal villages thought ULAB smelting has health effects. On the other hand, it seems that people who have no direct experience with smelting may not be aware of its health risks. Higher proportions of respondents in adjoining villages in both locations, where there have never been smelting activities, are not sure about ULAB smelting's health effects.

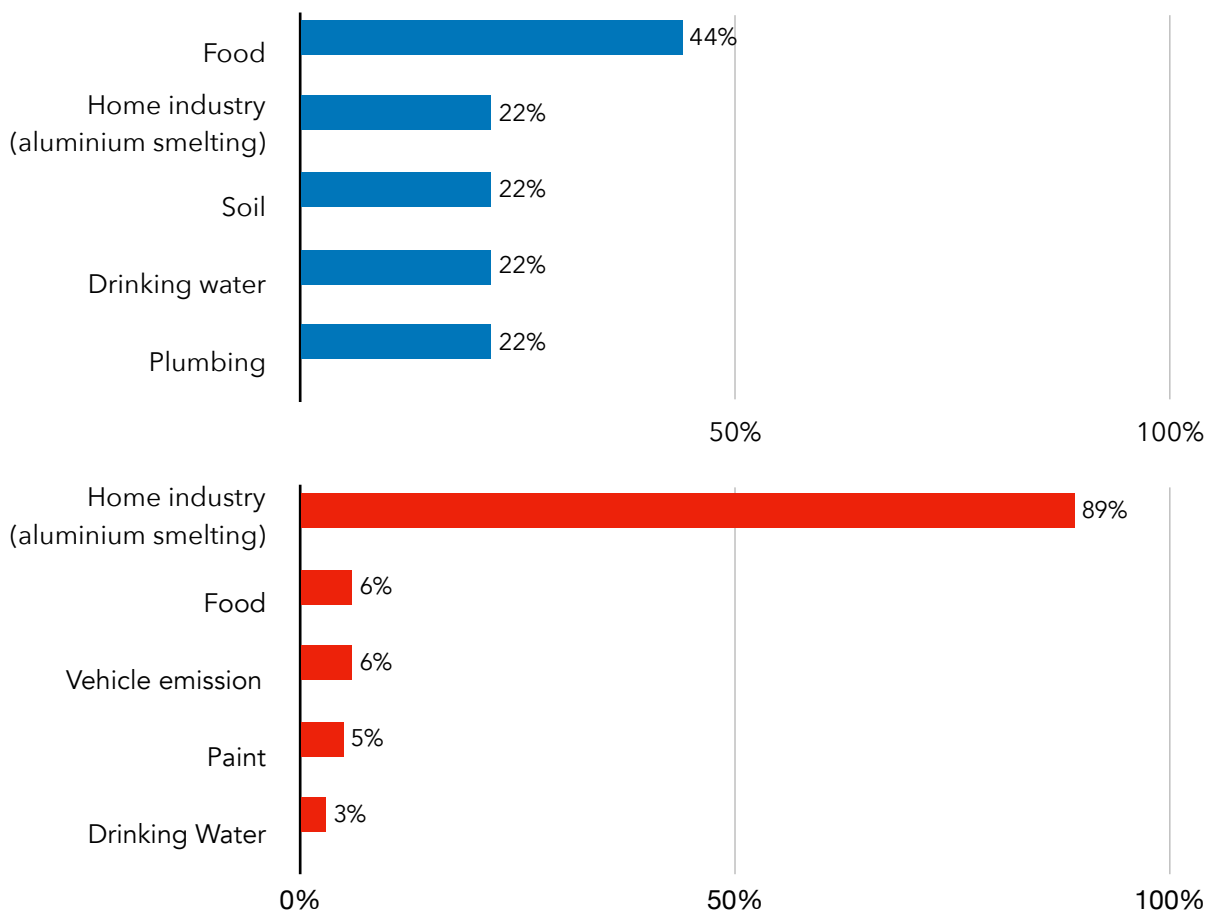
Those who were aware of negative health effects of ULAB smelting most commonly cited respiratory problems resulting from the smoke, including coughing, shortness of breath, sore throat, and in more severe cases lung infection. Other effects mentioned are related to treatable conditions resulting from recent exposure, including skin problems (from touching battery water), burns (from hot smelting ash), headaches, and eye irritation. Far fewer people identified long-term health effects of ULAB smelting, such as cognitive and behavioural problems, mental and physical disabilities.

While many people had experienced some effects from ULAB smelting, the majority of respondents in Bogor (71%) and Tegal (77%) think that **children under 5 and elders are the most vulnerable.** This is followed by children (6-18 yo), pregnant women, and people with existing respiratory ailments. Some people seem to have direct observation of other people in the community affected by the smelting. Around 43% in Bogor and 37% in Tegal say they know elders, children under 5, children aged 6-18, or adults experiencing respiratory problems due to ULAB smelting.

Graphic 11. Apart from ULAB smelters, are you aware of other activities or sources which may lead to lead exposure?

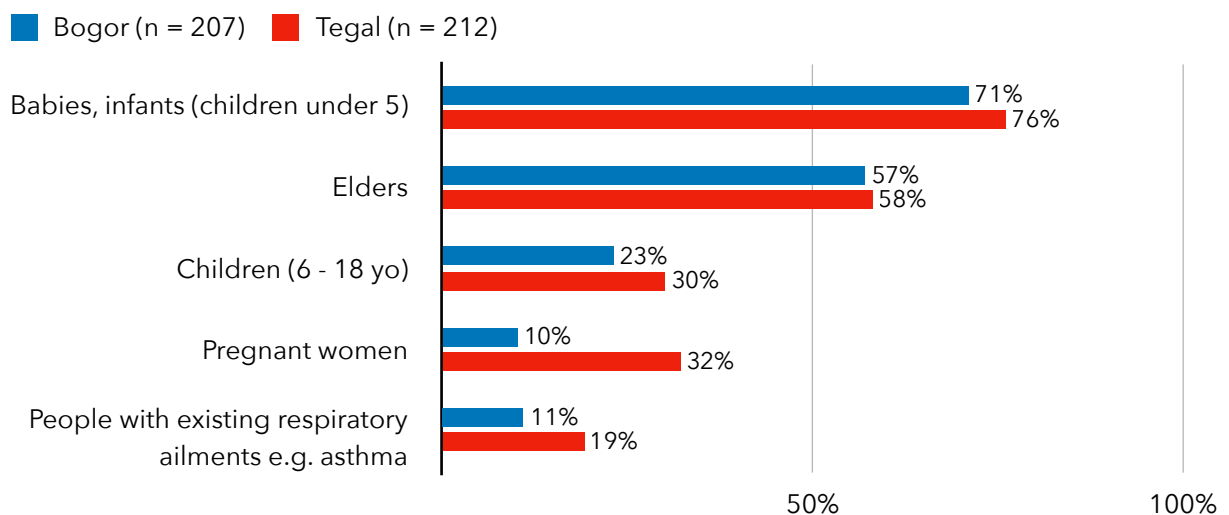


If yes, what are these?



There is little knowledge about the long-term effects from ULAB smelting. In discussions, cadres and fathers in Bogor said they heard that ULAB smelting waste can stay in the soil for long periods, but they were not sure how this works or the effects on people. People in the pFGDs disagreed about the extent to which ULAB smelting had developmental impacts in children. Some have heard about research or tests done in their communities related to ULAB smelting, but they rarely knew the results or the implications for them. For instance, people in Tegal say there was a blood test for their children in the past and were compensated for it, but they never got back the test results. A few village officials in Bogor recall a blood (lead level) test for children in the 2010s and heard that some children were found to have a mental disability, but these officials did not seem sure how ULAB smelting could lead to this. Most parents that we talked to did not know about the test or its results.

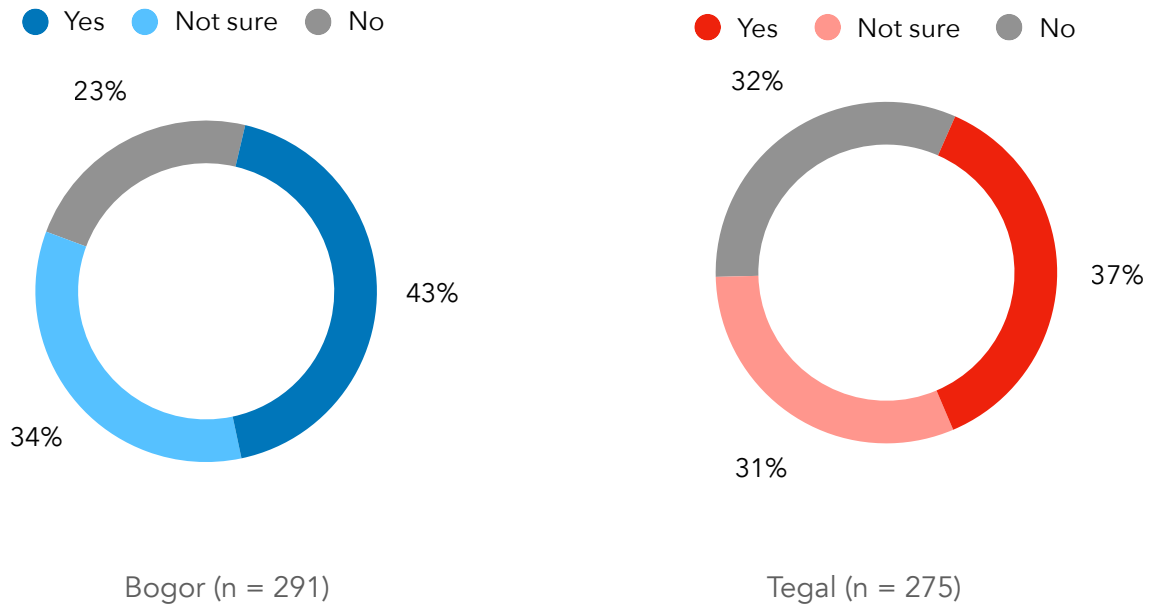
Graphic 12. Who do you think are more vulnerable to health problems resulting from ULAB smelting activities?



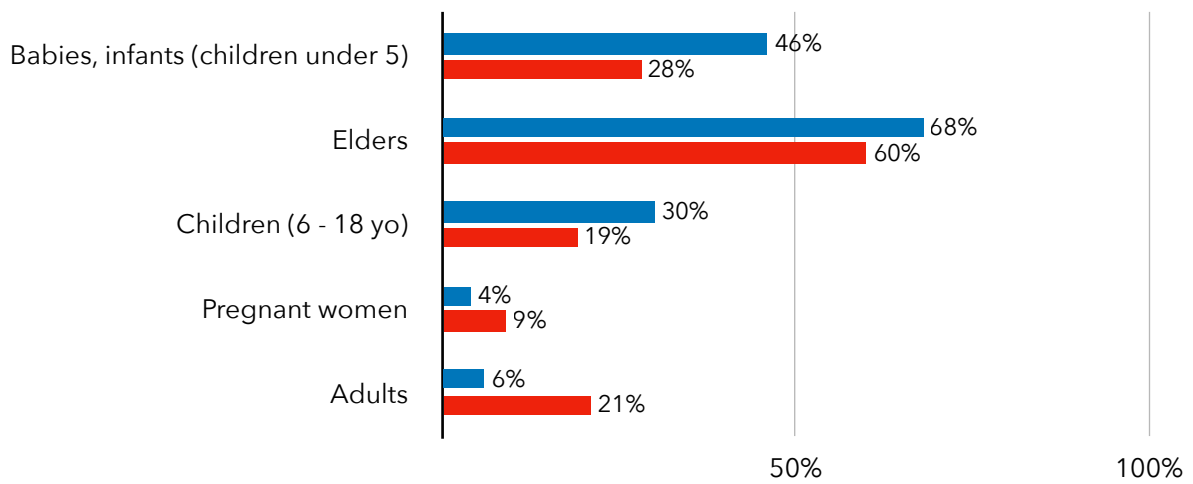
The obvious risk that people see is through the presence of ULAB smelting smoke, but people do not consider lead exposure through other sources such as smelting waste or contaminated water. People are aware of ULAB smelting waste that is still present in their surroundings such as *karaha* (smelting waste) and sacks of smelting waste in Bogor, and the smelting waste field in Tegal. However, they do not think these pose any health risk.

When responding to changing water colour or smell, some people did associate this with ULAB smelting although the majority do not. Only some community leaders and village officials in Tegal said they are aware of wells being contaminated by used battery water being thrown to the ground by smelters. Others say water from certain wells are no longer consumable because it smells or tastes bad—rather than related to health effects; some wells have even been closed by village authorities although people did not know the reason behind it.

Graphic 13. Do you know anyone who experienced health effects from ULAB smelting in your community?



If yes, who experienced this?



3.4 Practice - actions to mitigate effects

This section considers actions taken to mitigate the effects of lead exposure or ULAB smelting, including those at household and community level. Key findings related to practice include:

- People rarely take action to prevent lead exposure to themselves or their family members. This was attributed to the fact that people did not feel that taking such action was needed since the 2010s when ULAB smelting ended in the area.
- However, people often take practical actions to mitigate the effects or inconvenience resulting from changes in the environment that may be linked to ULAB smelting, including buying clean water or boiling water. This was done to avoid drinking water that smelled or tasted bad, rather than to avoid lead exposure.
- When ULAB smelting was still active in the villages, people took action to mitigate the effects of exposure rather than preventing the risks.
- At the community level, mitigation efforts have largely been driven by external stakeholders such as land rehabilitation projects and the closure of ULAB smelters by local governments.

Because people generally perceive no more risk from ULAB smelting since this ended in the 2010s, people do not implement actions to prevent lead exposure. On the other hand, **people take practical actions to mitigate the effects or inconvenience resulting from changes in the environment** that may be linked to ULAB smelting. For instance, people make adjustments in consuming water because of the changing water quality. People in Tegal no longer use groundwater for consumption because the water tastes bitter and smells, not because of how it affects their health, but continue to use the groundwater for other needs such as brushing teeth, sanitation, and washing dishes. Similarly, people in Bogor boil their water or leave it overnight and throw out any sediment that remains at the bottom. In relation to aluminium smelting smoke, people in Tegal do not apply any prevention measures and generally perceive little risks from the smoke. Some smelter workers shared that the local environment office promoted some safe practices such as washing ULAB parts to clean them from battery water and installing chimneys to prevent the smoke blowing directly onto surrounding houses. However, they think these are inefficient and installing chimneys adds a lot of cost to their operation. Some parents in Tegal who are informed about the land rehabilitation project and its risks do not allow their children to play close to the field, although our team saw children playing there during the fieldwork.

When ULAB smelting was still active in the villages, people took action to mitigate the effects they experienced rather than preventing the risks. For example, parents would seek treatment from health service providers if they had respiratory problems from inhaling the ULAB smelting smoke. Similarly, parents would take their children to health providers



Photo by Empatika team

| *A chimney in Tegal village to help keep smoke from smelting from blowing on to neighbouring houses. However, people we spoke with felt these were not that efficient and added too much cost to their operations*

when they had symptoms such as fever, cough, or weight loss – in more severe cases, children were diagnosed with spotted lungs and would be treated for 6-12 months. Many households in Bogor would cover the air ventilation in their homes with newspaper to reduce the smelting smoke getting inside the house. Parents and some youth recall they did not go outside the house during the day (Tegal) or in late afternoon (Bogor) when smelters did incineration and smoke was thick. In most cases, it was inevitable for people to inhale the ULAB smelting smoke and it caused shortness of breath or a sticky sensation in the throat. When this happened, people say they would just drink water.

Actions taken to mitigate **ULAB smelting effects have largely been driven by external stakeholders**. This primarily has taken the form of **land rehabilitation** of sites where ULAB smelters discarded their waste. Two such sites in Bogor were rehabilitated, including a field now used for sports and vacant land close to the river. Land rehabilitation in Tegal is currently ongoing and planned to continue until 2023. In Bogor and Tegal villages, land rehabilitation was supported by foreign donors collaborating with the local environment offices. In Tegal, there are signs indicating the areas slated for rehabilitation and indicating people should not access them, though these are not fenced off and children have continued to play there.

Additionally, **external stakeholders also initiated the closure of ULAB smelters in the 2010s in both locations**. In Bogor, this was driven by increasing incidence of respiratory problems as well as news coverage which labelled the village as an ‘idiot village’. Some people were upset particularly with the news coverage and protested, even damaging the

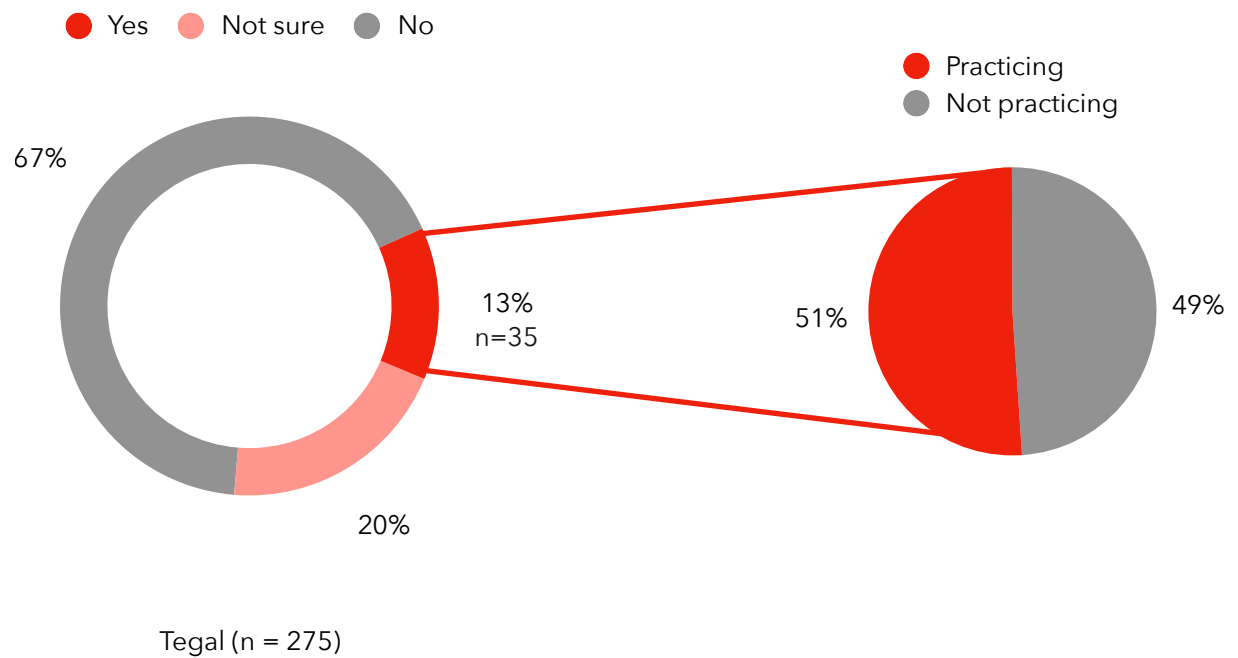
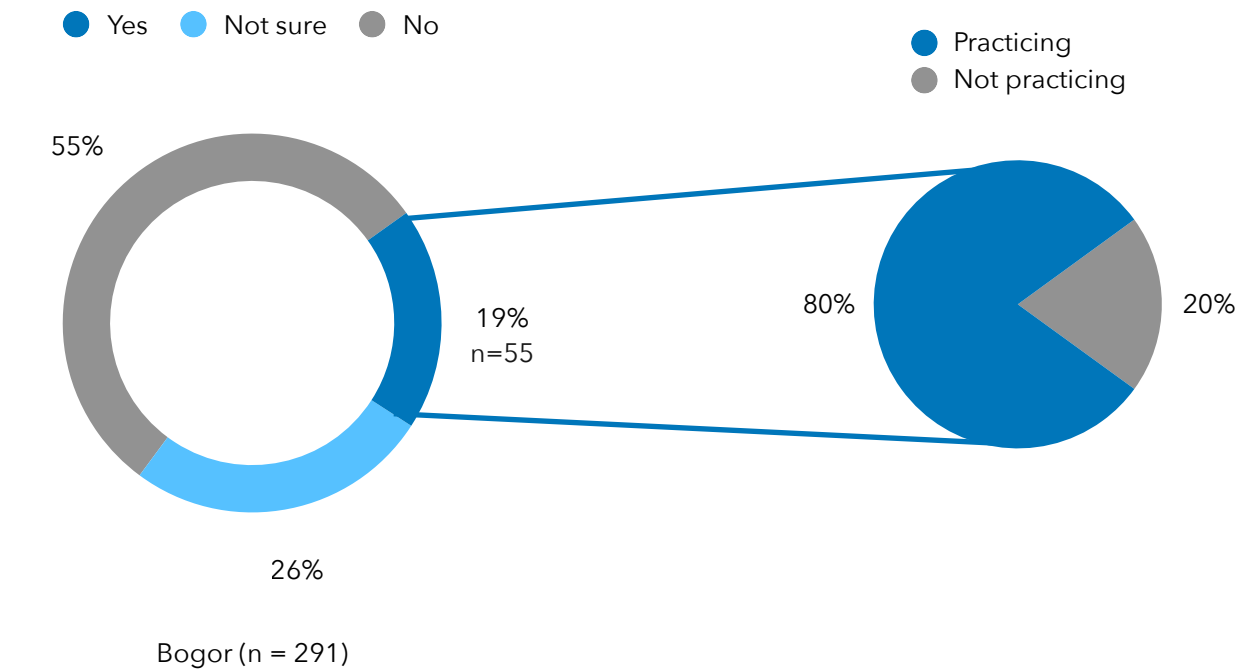


A waste field in Tegal village is being rehabilitated. It has a sign (left) warning people not to do any activities there, however it was not fenced off and children could access the area and play there.

sub-district office asking them to take action. In Tegal, the village and district government had considered relocating the metal smelters, including ULAB smelters, to another location. The plan was finally realised in 2010 when the vice *bupati* enforced a regulation for large-scale smelters to move from the village to a home industry complex in a neighbouring village. The decision to move the smelters, however, was not primarily because of considerations of health risks from ULAB smelting. People say the vice *bupati* made the decision because he owned a school next to ULAB smelting areas which imposed nuisance to the school, including noise and air pollution.

Most people that we met say **they are not aware of any health programme or promotion related to lead in their communities**, including any research dissemination although people commonly refer to multiple studies done in the villages over that past years. Village officials are typically more exposed to information dissemination, but not the wider community. Some village officials in Tegal tell us they participated in a session talking about dangerous and poisonous substances (*Bahan Berbahaya dan Beracun*, B3). However, they were not sure what the session was about partly because it was very technical and difficult to understand, and they did not know what should be considered as B3. The survey result reflects this as well with the majority answering that there is no, or not sure if there is any programme/promotion. Only a small percentage answer that there has been lead-related programme/promotion (19% in Bogor and 13% in Tegal) held by village office or health service providers e.g. Puskesmas. Some also said they practise the promoted health measure considering the risks posed by ULAB and the health benefits of the promoted measure. Those who do not practise the promoted measure say this is for different reasons such as that they are not involved in the activity; the promoted measure is only relevant to smelter workers; they do not think they are affected by lead exposure; or they are not motivated.

Graphic 14. Has there been any health programme/promotion related to lead in your community? If yes, do you practise the promoted measure in the health programme/promotion?



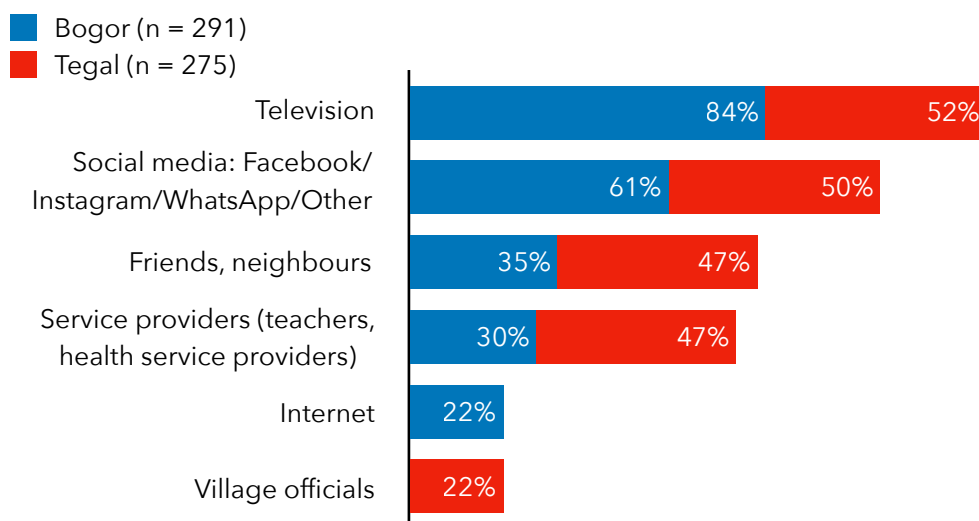
3.5 Sources of information

This section provides an overview of people’s preferred sources of information including those for health information, which mainly draw on survey results complemented by some insights from the pFGDs. This is followed by people’s views on the most effective approaches for health programmes to adopt. Key findings on this topic include:

- People primarily rely on TV and social media for a range of information.
- There is a strong preference for interpersonal modes of communication when sharing information related to health and/or lead exposure.
- Health service providers are the most trusted source of health information, including through home visits as well as through existing platforms like *posyandu* and visiting health facilities.
- Many people also considered health ‘socialisations’ or information sessions to be effective, provided that these included opportunities for two-way discussions with service providers.
- Most people are not aware of any health programme or promotion related to lead in their communities, including research dissemination, although people commonly refer to multiple studies that have been done in their village over the past years.

People receive information from various sources, with the most commonly cited source in both locations being TV and social media. These findings are elaborated below.

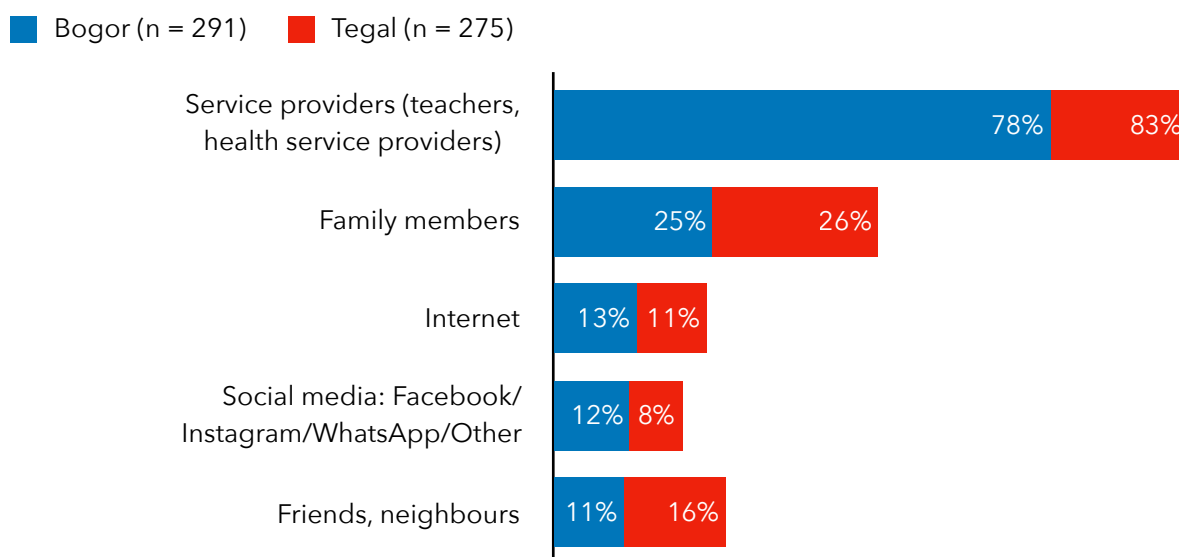
Graphic 15. Where do you usually get information?



People mentioned in the survey that they rely on different sources for different types of information. In Bogor and Tegal, people access TV and social media mainly for information about politics, laws, current affairs, as well as entertainment, culture, and sport. Information that people receive from friends and neighbours was more varied, including sharing personal updates as well as information related to health, business/economic, or politics from them.

The majority of people in Bogor and Tegal rely on local health service providers for information on their children’s health (78% and 83% respectively), followed by family members, friends, and neighbours, or information available on social media/internet. In pFGDs with both communities, people also shared that they trusted health providers, community leaders and family members for information on health.

Graphic 16. Which source of information would you trust most for children’s health information or if you have any concerns about their wellbeing or safety?

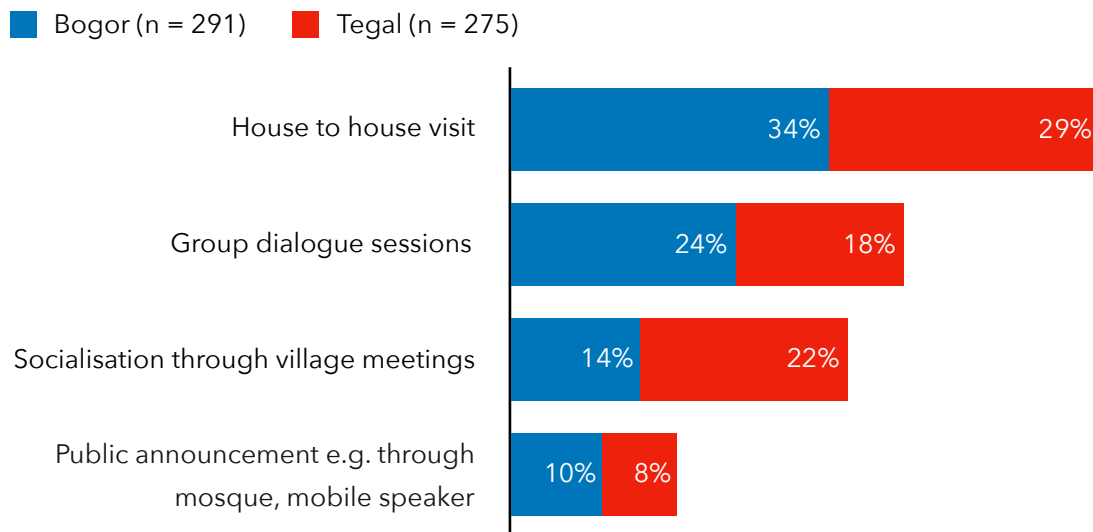


Approach for health programmes

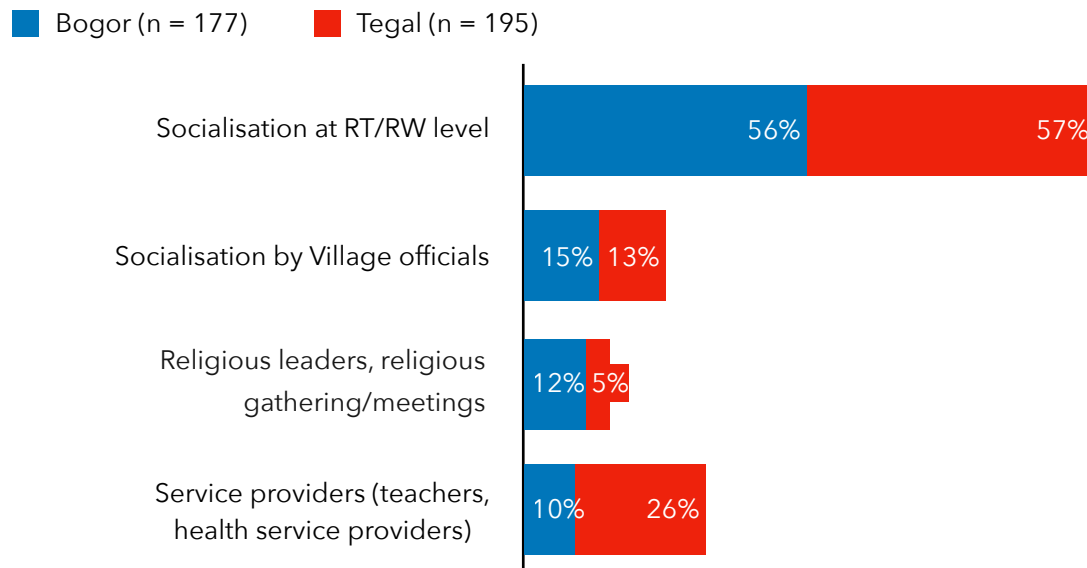
The survey considered people’s preferred approaches for programmes related to health promotion and lead exposure (see Section A and F in Questioner Annex). Responses to both these questions are relatively consistent, elaborated in the graphics below.

The responses are similar for both types of programmes, with some for both questions preferring community level activities such as village meetings (socialisation), group dialogues, or public announcements. Others chose a household or smaller group approach through house to house visits, service providers, or through religious leaders. Similar to the findings above, this can indicate the importance of interpersonal approaches in communicating health messages or interventions especially among parents and caregivers.

Graphic 17. When local government/health providers/others need to tell you about public health issues, what do you think is the best way for them to provide information/advice?



Graphic 18. What do you think are effective programmes/promotions to prevent lead exposure?



3.6 Developing communication for behaviour change

This section brings together key study findings to form the basis for efforts to promote positive behaviour change related to lead exposure. The first part gives an overview of the findings including key messages and recommended broader interventions. This is then followed by principles that can be used to guide the development of these approaches.

Insights to develop messages and communication strategy

This report has identified a number of key knowledge gaps and attitude challenges related to lead exposure. Together, these highlight the lack of motivation at the individual or community levels to prevent exposure to lead. Related to attitude, there is a strong association between perception of risk and visibility of the risk. For instance, people strongly associate ULAB smelting risks with visible signs of contamination in their communities, such as black smoke. As smelting or ULAB recycling has stopped in many communities, these immediate signs of risk are no longer visible, leading many people to conclude that there are no more ULAB smelting (lead) risks in their communities.

When people did perceive risk from these activities, this was primarily linked to smelting smoke. This risk was assessed based on the immediate respiratory problems caused by the smoke, which were believed to be treatable without long-term effects. In some cases where people did consider exposure to these activities to be somewhat risky, they appeared to accept these risks with an understanding that they were an important source of livelihoods. Though there was evidence of the impact of smelting on local water and vegetation, people rarely associated these with ULAB smelting and did not consider them risky.

The study found that these attitudes are closely intertwined with gaps in **knowledge** about lead exposure. Few people knew what lead was and those who claimed to know lead

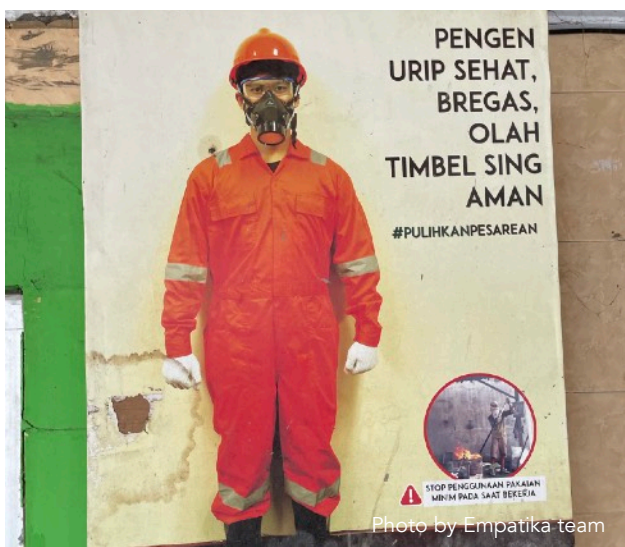


Photo by Empatika team



Photo by Empatika team

Posters in front of the village office in Tegal. The standing poster encourages steps for safely working with lead, such as changing into work clothes and rinsing these following work, but the team did not see anyone following these guidelines.

defined it as visible matter or an object, rather than a substance. People were more familiar with ULAB smelting and battery water, but did not know that these were possible sources of lead exposure. People were also not aware of other possible sources of lead in their community, nor did they consider the lingering waste from the smelting activities and changes in their environment such as affected plants and discoloured/bad tasting water to be dangerous. Even among those who had a sense that ULAB recycling or smelting could be hazardous for health, they were rarely aware of the long-term health effects of lead exposure, nor were they aware of the specific impact of lead exposure on child development.

Given that people do not consider lead producing activities to be risky and have significant gaps in knowledge on this topic, people rarely took measures to prevent lead exposure. Rather, on a daily basis community members continue to consume water and local plants despite possible contamination and do not take steps to avoid or manage smelting waste. Efforts to mitigate the risk of lead exposure have been mostly driven by external stakeholders focused on ending or relocating ULAB recycling and smelting. While the limited community programmes and sensitisation sessions on lead appear to be effective in shifting behaviour through knowledge sharing, these have been very small scale and limited to community leaders. Encouragingly, the study found that people trust health providers and community leaders for health information. Interpersonal and engaging approaches such as group discussions, information sharing sessions, or house to house visits were preferred ways to learn about health issues and may provide an avenue for future engagement.

Drawing on these findings, the following table identifies key gaps in each theme and implications for developing key messages as well as other accompanying interventions.

| Key constraints to change | Insights for key messages |
|---|---|
| Attitude | |
| ULAB smelting considered risky in the past when active, but not currently including water contamination | <ul style="list-style-type: none"> • Explanation of present risks of past ULAB smelting risk e.g. how they manifest, why the risk remains • Information on long term health effects and how this happen e.g. accumulate in human body • Practical, doable things to prevent lead exposure e.g. do's and don'ts related to lead exposure in the community, food intake, hygiene practice. |

| | |
|--|--|
| <p>ULAB smelting waste not considered risky, including land rehabilitation project</p> | <ul style="list-style-type: none"> • Specific information on what smelting waste is and why it is dangerous • Information about any risks from ULAB smelting waste and how they can affect health • Practical things to do when people find ULAB smelting waste e.g. avoid rehabilitated field, wash hands if people touch the waste sacks. |
| <p>Exposure to aluminium or other metal smelting considered normal</p> | <ul style="list-style-type: none"> • Information on health effects, including long term, of inhaling smelting smoke • Explanation of health effects by substances that cannot be observed with eye (i.e. beyond smoke and water) • Practical things to minimise exposure to smoke from metal smelting e.g. wear masks when going out, shut windows when smelters are operating • Doable safety measures for smelters e.g. change clothes before returning home, wash hands after work. |
| <p>Knowledge</p> | |
| <p>No understanding of lead and inclination to understand lead as something visible</p> | <ul style="list-style-type: none"> • Simple messaging (with visuals) demonstrating lead as a substance that cannot be seen • Explanation that lead can be absorbed into the body and environment. |
| <p>No understanding of sources of lead exposure and channels of exposure i.e. from ULAB smelting and other sources</p> | <ul style="list-style-type: none"> • Graphics/posters clearly showing sources of lead exposure, including sacks of smelting waste, discoloured water, affected plants, and other areas/things to avoid • Messages that clarify what is and is not risky, e.g. water that tastes bad is also bad for human body • Explanation of how individuals working in lead producing activities are exposed to lead and how they may expose others. |
| <p>No understanding of the longevity of lead pollution e.g. land, water contamination</p> | <ul style="list-style-type: none"> • Explanation that exposure to lead in one moment can have long-term impact • Clarification of signs of lead contamination such as impact water taste/smell and yellowed plants • Publish levels of lead detected in water or soil, phrased in simple terms, i.e. safe, unsafe, etc. |

| | |
|--|---|
| <p>Little to no knowledge about health effects (immediate and long terms) from lead exposure</p> | <ul style="list-style-type: none"> • Explanation how lead exposure affect health for different groups (e.g. infants, children, pregnant women, elders), both immediately and in long term • Information on exposure of children and developmental impacts, and symptoms that parents need to be aware of. |
|--|---|

The above challenges in attitude and gaps in knowledge form the basis of community practices related to lead exposure. While addressing these challenges and gaps will play a key role in shifting these practices, behaviour change requires a wider consideration of social and behaviour change communication, including activities to address people’s motivation to change and enable them to do so. To support the above messages targeting attitudes and knowledge, outlined below are activities that can support some gaps in practices related to lead exposure.

| Constraints in practice | Supporting activities |
|---|---|
| <p>Consuming or using water that taste bad, smell, or has changed colour</p> | <ul style="list-style-type: none"> • Test water sources in the community and publish test results in easy to understand terms e.g. safe, unsafe. This should also include practical implications e.g. accessing safe water sources • Based on the test, close access to contaminated water sources • Training for health providers about water contamination and how to explain this in a way that is easy to understand for people. |
| <p>Eating fruits grown on former waste field/rehabilitated land</p> | <ul style="list-style-type: none"> • Engagement with community leaders and community members to jointly identify ‘safe’ areas for growing, led by community leaders with support from other experts • Provision of additional land/growing area to community members whose land is not considered safe. |
| <p>Not forbidding children from playing nearby rehabilitated land</p> | <ul style="list-style-type: none"> • Close access to rehabilitated land e.g. installing fence, and have health providers, village officials or community leaders to remind parents and children not to play there • Provision of alternative safe playing area for children. |
| <p>No prevention to ULAB smelting waste e.g. sitting on waste sacks, no smelting waste management</p> | <ul style="list-style-type: none"> • Signs to mark presence of ULAB waste e.g. sacks, smelting ash, and what people need to do e.g. do not touch them, wash hands if they touch contaminated soil/water • Removal of ULAB smelting waste from the area and rehabilitation of land, water sources, including engagement with local officials and potential use of village funds. |
| <p>Not using protective gear when doing smelting work</p> | <ul style="list-style-type: none"> • Regulating smelting activities in the community e.g. number of smelters allowed, size of the smelters, distance from people’s houses. |

Guiding principles

Drawing on the fieldwork process, this section proposes some guiding principles that can be used when developing messages for the target community as well as other communication strategies to encourage preventive behaviours.

- **Fully involved.** People appreciate when they are fully involved in the process especially when they learn about something new, rather than one-way communication. In both locations, some people mentioned information sessions they have participated in where they only listen to other people talking. People shared that they do not always understand what is being discussed in information sessions, especially when technical terms are used. In one of Empatika's pFGD exercises, researchers discussed water and smoke contamination with community members using simple experiments (see Box 1). This allows engagement with participants through hands-on activities and people can explore the topic in relation to their everyday life.
- **Space to ask questions.** In addition to engaging people, message dissemination or communication strategy need to give space for people to ask questions or to air their concerns. This is often not a one-time moment, but a continuous process that will allow people to refine their knowledge and attitude at their own pace. For instance, people in both locations have heard about many research on lead in their area but never knew about the results and do not know who they can ask. This curiosity is an opportunity to engage them in discussion about lead risks.
- **Learn by doing themselves.** Part of the adult learning process is for participants to learn by themselves, rather than being told. When people have their own reflection about something new, it allows people to make the connection of how it applies to their lives and therefore make their own decision, such as applying the new knowledge or adopting preventive behaviour.
- **Easy to understand.** Messages and communication strategy need to be clear and easy for people to understand. This is particularly relevant to lead exposure of which the risks are not always visible or immediately experienced. One way to do this is to link the information or communication strategy to examples that people can relate to in their daily lives e.g. discussing lead in water that people use everyday.

Box 1. Water and smoke experiment

One of the key findings in the study is that people tend to perceive risks from materials that can be observed and give direct or immediate effects e.g. black smoke from ULAB smelting. Empatika carried out this exercise to incite discussion about lead exposure in the communities beyond its visible risks, particularly related to water and smoke.

Water experiment

- Facilitator collect water from different sources in the community (e.g. spring, river, battery water), and put them in clear containers.
- Ask participants to guess the water. Let them smell, touch, and observe the water.
- Participants write down their answers on a paper for each water. Facilitator then reveal the answer for each water.
- Ask participants to rank the water from the most to least healthy
- Discuss with the participants:
 - What makes this water healthy/not? What is in the water?
 - Has the water always been like this?
 - How does different water affect your health?
 - What will happen if water (the less healthy) gets inside the body? What will you do?



Smoke experiment

- Prepare some balloons and fill them with different ingredients to visualise smoke e.g. sugar, fine sugar, pepper, flour.
- Pop one balloon each (facilitator can put on a lighter at the bottom to pop the balloon)
- Ask participants to guess the ingredient in each balloon based on the smell, colour, how far the ingredients spread. Facilitator then reveal the answer.
- Discuss with the participants:
 - How are the smokes different/same?
 - Has the smoke always been like this (smell, colour)?
 - How do these different smoke affect your health?
 - What will happen if smoke gets inside the body? What will you do?



Annexes

Annex 1. Questionnaire

Section A. Media and information consumption / Media dan informasi

| | |
|---|---|
| <p>1. Where do you usually get information? Select top 3 that apply</p> <ul style="list-style-type: none">a. Family membersb. Friends, neighboursc. Newspaperd. Radioe. TVf. Social media (specify): Facebook/Instagram/WhatsApp/ Other _____g. Interneth. Religious leaders, religious gathering/meetings e.g. sermoni. Village officialsj. Service providers (teachers, health service providers e.g. Posyandu, Puskesmas)k. Printed materials (leaflets, poster, banners)l. Community groups (arisan, PKK)V. Other, specify _____V. Other, specify _____V. Other, specify _____ | <p>1. Dari mana biasanya Bapak/Ibu mendapatkan informasi? Pilih 3 yang paling sesuai</p> <ul style="list-style-type: none">a. Anggota keluargab. Teman, tetanggac. Korand. Radioe. TVf. Sosial media (sebutkan): Facebook/Instagram/WhatsApp/ Lainnya _____g. Interneth. Pemuka agama, pertemuan/kelompok agama mis. kotbahi. Pejabat desaj. Penyedia layanan (guru, tenaga kesehatan mis. Posyandu, Puskesmas)k. Bahan cetak (leaflet, poster, spanduk)l. Kelompok/komunitas (arisan, PKK)V. Lainnya, _____V. Lainnya, _____V. Lainnya, _____ |
|---|---|

| | |
|--|---|
| <p>2a. From ____, what kind of information do you mostly get? Based on answers from question 1</p> <ol style="list-style-type: none"> 1. Politics, laws, current affairs 2. Business, economics 3. Connecting with others (family, friends) 4. Entertainment, culture, sport 5. Health 99. Other, specify _____ | <p>2a. Dari sumber informasi ____, informasi apa saja yang sering Bapak/Ibu dapat? Berdasarkan jawaban pertanyaan 1</p> <ol style="list-style-type: none"> 1. Politik, hukum, kabar terkini 2. Bisnis, ekonomi 3. Kabar dari orang lain (keluarga, teman) 4. Hiburan, budaya, olahraga 5. Kesehatan 99. Lainnya, _____ |
| <p>2b. From ____, what kind of information do you mostly get? Based on answers from question 1</p> <ol style="list-style-type: none"> 1. Politics, business, current affairs 2. Connecting with others (family, friends) 3. Entertainment, culture, sport 4. Health 99. Other, specify _____ | <p>2b. Dari sumber informasi ____, informasi apa saja yang sering Bapak/Ibu dapat? Berdasarkan jawaban pertanyaan 1</p> <ol style="list-style-type: none"> 1. Politik, bisnis, kabar terkini 2. Kabar dari orang lain (keluarga, teman) 3. Hiburan, budaya, olah raga 4. Kesehatan 99. Lainnya, _____ |
| <p>2c. From ____, what kind of information do you mostly get? Based on answers from question 1</p> <ol style="list-style-type: none"> 1. Politics, business, current affairs 2. Connecting with others (family, friends) 3. Entertainment, culture, sport 4. Health 99. Other, specify _____ | <p>2c. Dari sumber informasi ____, informasi apa saja yang sering Bapak/Ibu dapat? Berdasarkan jawaban pertanyaan 1</p> <ol style="list-style-type: none"> 1. Politik, bisnis, kabar terkini 2. Kabar dari orang lain (keluarga, teman) 3. Hiburan, budaya, olah raga 4. Kesehatan 99. Lainnya, _____ |

| | |
|--|--|
| <p>3. Which source of information would you trust most for children's health information (e.g. child rearing or illness)? (maximum 3)</p> <ol style="list-style-type: none"> Family members Friends, neighbours Newspaper Radio TV Social media (specify): Facebook/Instagram/WhatsApp/ Other _____ Internet Religious leaders, religious gathering/meetings e.g. sermon Village officials Service providers (teachers, health service providers e.g. Posyandu, Puskesmas) Printed materials (leaflets, poster, banners) Community groups (arisan, PKK) Other, specify _____ | <p>3. Sumber informasi mana saja yang Bapak/Ibu paling percaya untuk kesehatan anak (mis. cara membesarkan anak atau ketika anak sakit)? (maksimal 3)</p> <ol style="list-style-type: none"> Anggota keluarga Teman, tetangga Koran Radio TV Sosial media (sebutkan): Facebook/Instagram/WhatsApp/ Lainnya _____ Internet Pemuka agama, pertemuan/kelompok agama mis. kotbah Pejabat desa Penyedia layanan (guru, tenaga kesehatan mis. Posyandu, Puskesmas) Bahan cetak (leaflet, poster, spanduk) Kelompok/komunitas (arisan, PKK) Lainnya, _____ |
| <p>4. Can you recall any public health program or socialisation which you thought was successful in your community or elsewhere?</p> <ol style="list-style-type: none"> Yes, the campaign/information was about _____ No | <p>4. Apakah Bapak/Ibu ingat program atau sosialisasi kesehatan yang menurut Bapak/Ibu berhasil di lingkungan Anda atau tempat lainnya?</p> <ol style="list-style-type: none"> Ya, kampanye/informasinya tentang _____ Tidak |

5. When local government/health providers/others need to tell you about public health issues (e.g. COVID, water source quality, smoking harm, vaccination, etc) what do you think is the best way for them to provide information/advice?

1. Posters
2. Banners
3. Public announcement e.g. through mosque, mobile speaker
4. Socialisation through village meetings
5. Group dialogue sessions
6. House to house visits
7. One on one discussion
8. Peer support groups
9. Religious leaders, religious gathering/meeting
10. Information leaflets
11. Videos
12. Social Media
99. Other, _____

5. Jika pemerintah setempat/petugas kesehatan/lainnya ingin memberitahu Bapak/Ibu tentang isu kesehatan (mis. COVID, kualitas sumber air, bahaya merokok, vaksinasi, dll), menurut Bapak/Ibu apa cara terbaik untuk melakukan itu?

1. Poster
2. Spanduk
3. Pengumuman, misalnya lewat masjid, pengeras suara keliling
4. Sosialisasi melalui rapat desa
5. Sesi dialog kelompok
6. Kunjungan ke rumah-rumah
7. Diskusi personal
8. Kelompok dukungan sebaya
9. Melalui pemuka agama/acara keagamaan (DKM, khotbah, pengajian)
10. Selebaran
11. Video
12. Melalui media sosial
99. Lainnya, _____

Section B. Health Support / Kesehatan

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| <p>1. From your experience, what health problems do children in the community commonly have? Select all that apply</p> <ul style="list-style-type: none"> a. Common cold (batuk pilek) b. Fever c. Diarrhea d. Skin irritation e. Typhoid f. Dengue g. TB h. Respiratory problem (short breath, asthma) i. Cognitive/mental problems e.g. learning difficulties, speech delay j. Physical problems e.g. short V. Other, ____ V. Other, ____ V. Other, ____ | <p>1. Berdasarkan pengalaman Bapak/Ibu, apa saja masalah kesehatan yang biasanya dialami anak-anak di lingkungan ini? Pilih yang sesuai</p> <ul style="list-style-type: none"> a. Batuk pilek b. Demam c. Diare d. Iritasi kulit e. Tipus f. Demam berdarah g. TBC/tuberkulosis h. Masalah pernapasan (sesak nafas, asma) i. Masalah kognitif/berkebutuhan khusus (hambatan perkembangan) mis. kesulitan belajar, terlambat bicara j. Masalah fisik mis. pendek (hambatan pertumbuhan) V. Lainnya, ____ V. Lainnya, ____ V. Lainnya, ____ |
| <p>2. Among the illnesses above, which ones concern you most?</p> <p>Insert answers from Q1. Respondents choose max. 3.</p> | <p>2. Dari penyakit-penyakit tersebut, penyakit mana saja yang Bapak/Ibu paling khawatirkan?</p> <p>Masukkan jawaban dari Pertanyaan 1, responden pilih maks. 3</p> |

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| <p>3. For each health problem that you mentioned, what do you think cause them? Insert answers from Q2</p> <p>a. [health problem] - cause _____</p> <p>b. [health problem] - cause _____</p> <p>c. [health problem] - cause _____</p> | <p>3. Untuk setiap masalah kesehatan yang disebutkan, menurut Bapak/Ibu apa penyebabnya? Masukkan jawaban dari Pertanyaan 2</p> <p>a. [masalah kesehatan] - karena _____</p> <p>b. [masalah kesehatan] - karena _____</p> <p>c. [masalah kesehatan] - karena _____</p> |
| <p>4. What do you think can prevent children from the health problems you mentioned?</p> <p>a. [health problem] - prevention _____</p> <p>b. [health problem] - prevention _____</p> <p>c. [health problem] - prevention _____</p> | <p>4. Menurut Bapak/Ibu, apa yang dapat mencegah anak dari masalah kesehatan yang disebutkan tadi?</p> <p>a. [masalah kesehatan] - pencegahan _____</p> <p>b. [masalah kesehatan] - pencegahan _____</p> <p>c. [masalah kesehatan] - pencegahan _____</p> |

Section C. Knowledge - environmental health / Pengetahuan - kesehatan lingkungan

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| <p>1. What are the water source(s) for drinking and cooking used in your household?</p> <p>a. Ground water (using electric pump, well)</p> <p>b. Spring water</p> <p>c. Paid piped water (PDAM)</p> <p>d. Other piped water, such as _____</p> <p>e. Waterbody (river, lake, etc)</p> <p>f. Buy bottled</p> <p>g. Buy refill water</p> <p>h. Rain water</p> <p>V. Other, _____</p> | <p>1. Apa sumber air yang digunakan untuk minum dan masak di rumah Bapak/Ibu?</p> <p>a. Air tanah (menggunakan pompa listrik, sumur)</p> <p>b. Mata air</p> <p>c. Air pipa (PDAM)</p> <p>d. Air pipa lainnya, sebutkan _____</p> <p>e. Air permukaan (sungai, danau, dll)</p> <p>f. Membeli air kemasan</p> <p>g. Air isi ulang</p> <p>h. Air hujan</p> <p>V. Lainnya, _____</p> |
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| <p>2. In the last 10 years, have you ever changed the water source?</p> <ol style="list-style-type: none"> 1. Yes 2. No | <p>2. Dalam 10 tahun terakhir, apakah Bapak/Ibu pernah mengganti sumber air?</p> <ol style="list-style-type: none"> 1. Ya 2. Tidak |
| <p>3. In the last 10 years, Has the quality of this water source you use changed s?</p> <ol style="list-style-type: none"> 1. It's worse now 2. It's better now 3. Same, still bad 4. Same, still good 5. Not sure <p>Why: _____</p> | <p>3. Dalam 10 tahun terakhir, apakah kualitas sumber air yang Bapak/Ibu gunakan:</p> <ol style="list-style-type: none"> 1. Sekarang lebih buruk 2. Sekarang lebih baik 3. Sama saja - tetap buruk 4. Sama saja - tetap baik 5. Tidak tahu <p>Kenapa? _____</p> |
| <p>4. In your opinion, what are the sources of pollutants in your area?</p> <p>Select all that apply</p> <ol style="list-style-type: none"> a. Factory/industry smoke b. Factory/industry waste c. Household waste d. Household sewage e. Sand excavation f. Agricultural chemicals g. Cars/buses/trucks/motorcycles h. ULAB recycling facilities i. Metal/aluminum smelter j. Open defecation k. Smoking l. Other, specify _____ | <p>4. Menurut Bapak/Ibu, apa saja sumber pencemaran di lingkungan tempat tinggal Bapak/Ibu? Pilih yang sesuai</p> <ol style="list-style-type: none"> a. Asap pabrik/industri b. Limbah pabrik/industri c. Sampah rumah tangga d. Limbah rumah tangga ke got/sungai e. Penggalian pasir f. Bahan kimia pertanian g. Mobil/bus/truk/sepeda motor h. Tempat peleburan aki bekas i. Tempat peleburan/pengecoran logam/aluminium j. Buang air besar sembarangan k. Merokok l. Lainnya, sebutkan _____ |

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| <p>5. Which of the above sources of pollution ____ (ranking answers from question 6, starting from the most concerning) worries you? (max 3)</p> | <p>5. Manakah dari sumber polusi ____ (ranking jawaban pertanyaan 6 dari yang paling mengkhawatirkan) mana yang Bapak/Ibu khawatirkan? (maksimal 3)</p> |
| <p>6a. In the last 10 years, has this ____ changed? Insert answers from Question 5</p> <ol style="list-style-type: none"> 1. Remain the same 2. Got worse 3. Got better 4. Not sure | <p>6a. Dalam 10 tahun terakhir, apakah ____ (masukkan jawaban dari Pertanyaan 5)</p> <ol style="list-style-type: none"> 1. Sama saja 2. Makin buruk 3. Makin baik 4. Tidak tahu |
| <p>6b. In the last 10 years, has this ____ changed? Insert answers from Question 5</p> <ol style="list-style-type: none"> 1. Remain the same 2. Got worse 3. Got better 4. Not sure | <p>6b. Dalam 10 tahun terakhir, apakah ____ (masukkan jawaban dari Pertanyaan 5)</p> <ol style="list-style-type: none"> 1. Sama saja 2. Makin buruk 3. Makin baik 4. Tidak tahu |
| <p>6c. In the last 10 years, has this ____ changed? Insert answers from Question 5</p> <ol style="list-style-type: none"> 1. Remain the same 2. Got worse 3. Got better 4. Not sure | <p>6c. Dalam 10 tahun terakhir, apakah ____ (masukkan jawaban dari Pertanyaan 5)</p> <ol style="list-style-type: none"> 1. Sama saja 2. Makin buruk 3. Makin baik 4. Tidak tahu |

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| <p>7. Do you think smoke is: from melting or burning trash, ULAB, aluminum have the same effect?</p> <ol style="list-style-type: none"> 1. The same no matter what is being burned 2. Different, depending on what is being burned smoke from ____ is worse compared to others 3. Not sure | <p>7. Menurut Bapak/Ibu, apakah asap hasil pembakaran sampah, aki, aluminium memiliki dampak yang sama?</p> <ol style="list-style-type: none"> 1. Sama 2. Berbeda, asap ____ lebih buruk dibanding yang lain 3. Tidak tahu |
| <p>8. Do you think your environment is:</p> <ol style="list-style-type: none"> 1. Very clean 2. Clean 3. Polluted 4. Very polluted 5. Not sure | <p>8. Menurut Bapak/Ibu apakah lingkungan tempat tinggal Bapak/Ibu:</p> <ol style="list-style-type: none"> 1. Sangat bersih 2. Bersih 3. Tercemar 4. Sangat tercemar 5. Tidak tahu |
| <p>9. Who do you think is responsible for ensuring a clean environment in your RW?</p> <ol style="list-style-type: none"> a. Big businesses that created the pollution b. Small business activities that created the pollution c. Community members (us) d. Local government e. National Government f. All of the above V. Other, ____ | <p>9. Menurut Bapak/Ibu siapa yang bertanggung jawab untuk menjaga lingkungan ini bersih?</p> <ol style="list-style-type: none"> a. Perusahaan besar yang menghasilkan polusi b. Perusahaan kecil yang menghasilkan polusi c. Anggota masyarakat d. Pemerintah setempat e. Pemerintah nasional f. Semua jawaban di atas V. Lainnya, __ |

Section D. Knowledge - lead exposure / Pengetahuan - paparan timbal

| | |
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| <p>1. We heard about ULAB smelting activity here/near your village. How concerned are you now about the presence of ULAB smelting? (not worried at all - very worried)</p> <ol style="list-style-type: none"> 1. Not worried at all 2. Have been worried but not now. 3. Neither worried nor not worried /neutral 4. Worried 5. Very worried | <p>1. Kami mendengar ada peleburan aki bekas di sini/dekat desa Bapak/Ibu. Seberapa khawatirkah Bapak/Ibu tentang keberadaan peleburan aki bekas? (dari tidak khawatir sama sekali sampai sangat khawatir)</p> <ol style="list-style-type: none"> 1. Tidak khawatir sama sekali 2. Pernah khawatir tapi sekarang tidak 3. Antara khawatir dan tidak/Netral 4. Khawatir 5. Sangat khawatir |
| <p>2. Why? Select all that apply</p> <ol style="list-style-type: none"> a. There is no ULAB smelting continuing in the village b. ULAB smelting activity has decreased c. Lead from the smelting activity is not poisonous d. The smelting does not cause any health effect e. It is a source of income f. Effects have been exaggerated g. There is no proof that smelting causes health problems h. Effects of smoke inhalation can be cured i. There are many reasons why people have respiratory problems, not just smelter activity j. Lead from the smelting activity is poisonous k. The smelting waste can stay for a long time V. Other, specify _____ | <p>2. Mengapa? Pilih yang sesuai</p> <ol style="list-style-type: none"> a. Sudah tidak ada lagi peleburan aki bekas di desa b. Peleburan aki bekas sudah berkurang c. Timbal dari peleburan tidak beracun d. Peleburan aki bekas tidak menyebabkan efek kesehatan apapun e. Peleburan adalah sumber penghasilan f. Dampak kesehatan terlalu dibesar-besarkan g. Tidak ada bukti bahwa peleburan menyebabkan masalah h. Dampak dari menghirup asap dari peleburan aki bekas bisa disembuhkan i. Masalah pernapasan disebabkan oleh hal lain, bukan hanya karena aktivitas peleburan aki bekas. j. Timbal dari peleburan beracun k. Limbah peleburan aki bekas bisa bertahan lama v. lainnya_____ |

| | |
|--|--|
| <p>3. Do you think ULAB smelting has any effect on health ?</p> <ol style="list-style-type: none"> 1. Yes 2. No → skip to question 6 3. Not sure → skip to question 6 | <p>3. Menurut Bapak/Ibu, apakah peleburan aki bekas dapat menyebabkan masalah kesehatan?</p> <ol style="list-style-type: none"> 1. Ya 2. Tidak → pertanyaan 6 3. Tidak tahu → pertanyaan 6 |
| <p>4. What are the health effects from ULAB smelting?</p> <ol style="list-style-type: none"> a. Respiratory problems b. Skin problems c. Diarrhea d. Abdominal pain e. Weight loss f. Headaches g. Learning difficulties h. Behavior problems V. Other, specify ____ <p>Continue to question 6</p> | <p>4. Apa saja masalah kesehatan akibat peleburan aki bekas?</p> <ol style="list-style-type: none"> a. Masalah pernapasan b. Masalah kulit c. Diare d. Sakit pada area perut e. Penurunan berat badan f. Sakit kepala g. Kesulitan belajar h. Masalah perilaku V. Lainnya, sebutkan ____ <p>Lanjut ke pertanyaan 6</p> |
| <p>6. Are some people more vulnerable to health problems resulting from ULAB smelting activities?</p> <ol style="list-style-type: none"> 1. Yes 2. No → question 8 3. Not sure → question 8 | <p>6. Apakah ada orang yang lebih mudah terkena masalah kesehatan akibat peleburan aki bekas?</p> <ol style="list-style-type: none"> 1. Ya 2. Tidak → pertanyaan 8 3. Tidak tahu → pertanyaan 8 |

| | |
|--|--|
| <p>7. Who do you think are more vulnerable to health problems resulting from ULAB smelting activities? Select all that apply</p> <ol style="list-style-type: none"> Babies, infants (children under 5) Children (6 - 18 yo) Pregnant women Elders People with existing respiratory ailments e.g. asthma Do not know Other, specify _____ | <p>7. Siapa yang menurut Bapak/Ibu lebih mudah mengalami masalah kesehatan akibat peleburan aki bekas? Pilih yang sesuai</p> <ol style="list-style-type: none"> Bayi, balita (umur di bawah 5 tahun) Anak-anak (usia 6-18 tahun) Ibu hamil Lansia Orang dengan riwayat sakit pernapasan, seperti asma Tidak tahu Lainnya, sebutkan _____ |
| <p>8. Apart from ULAB smelters, are you aware of other activities or sources which may lead to lead exposure?</p> <ol style="list-style-type: none"> Yes No → Section E Not sure → Section E | <p>8. Selain peleburan aki bekas, apakah ada aktivitas atau sumber lain yang dapat menyebabkan paparan timbal?</p> <ol style="list-style-type: none"> Ya Tidak → Bagian E Tidak tahu → Bagian E |
| <p>10. What are these? Select all that apply</p> <ol style="list-style-type: none"> Home industry (aluminum smelting) Food Ceramics Soil Fish and meat Air Drinking water Food/water container Paint Painted toys, playground Vehicle emission Others, _____ | <p>10. Apa saja? Pilih yang sesuai</p> <ol style="list-style-type: none"> Industri rumah tangga (peleburan aluminium) Makanan Keramik Tanah Ikan dan daging Udara Air minum Wadah makanan/minuman Cat Mainan yang dicat Asap kendaraan Lainnya, _____ |

Section E. Lead - health effects / Timbal - dampak kesehatan

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|---|--|
| <p>1. Have you ever heard about lead?</p> <ol style="list-style-type: none"> 1. Yes 2. No → question 4 | <p>1. Apakah Bapak/Ibu pernah mendengar tentang timbal?</p> <ol style="list-style-type: none"> 1. Ya 2. Tidak [?] pertanyaan 4 |
| <p>2. What do you think lead is?</p> <ol style="list-style-type: none"> 1. Lead is ____ 2. Do not know | <p>2. Menurut Bapak/Ibu, apakah itu timbal? ____</p> <ol style="list-style-type: none"> 1. Timbal adalah ____ 2. Tidak tahu |
| <p>3. To what extent do you think you and your family members are at health risk of lead exposure?</p> <ol style="list-style-type: none"> 1. Very high risk 2. High risk 3. Moderate 4. Low risk 5. Very low risk 6. Not sure | <p>3. Menurut Bapak/Ibu, seberapa beresiko Bapak/Ibu dan keluarga mengalami masalah kesehatan jika timbal masuk ke dalam tubuh Bapak/Ibu dan keluarga?</p> <ol style="list-style-type: none"> 1. Sangat berisiko 2. Risiko tinggi 3. Sedang 4. Risiko rendah 5. Risiko sangat rendah 6. Tidak tahu |
| <p>4. Do you think your community has ____ level of lead exposure compared to neighboring communities?</p> <ol style="list-style-type: none"> 1. Higher 2. Same 3. Lower 4. Not sure | <p>4. Dibandingkan desa di sekitar, apakah tempat tinggal Bapak/Ibu memiliki timbal yang:</p> <ol style="list-style-type: none"> 1. Lebih tinggi 2. Sama 3. Lebih rendah 4. Tidak tahu |

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| <p>4. Do you know someone or more who experienced health effects from ULAB smelting in your community?</p> <ol style="list-style-type: none"> 1. Yes 2. No → Section F 3. Not sure → Section F | <p>4. Apakah Bapak/Ibu tahu seseorang/lebih yang sakit akibat peleburan aki bekas di tempat tinggal Bapak/Ibu?</p> <ol style="list-style-type: none"> 1. Ya 2. Tidak → Bagian F 3. Tidak tahu → Bagian F |
| <p>5. Who experienced these? (maximum 3)</p> <ol style="list-style-type: none"> a. Babies, infants (children under 5) b. Children (6 - 18 yo) c. Pregnant women d. Elders V. Other, specify _____ | <p>5. Siapa yang mengalami hal tersebut? (maksimal 3)</p> <ol style="list-style-type: none"> a. Bayi, anak-anak (umur di bawah 5 tahun) b. Anak-anak (usia 6-18 tahun) c. Ibu hamil d. Lansia V. Lainnya, _____ |
| <p>6a. What are the health effects for ____?</p> <ol style="list-style-type: none"> a. Respiratory problems b. Skin problems c. Diarrhea d. Abdominal pain e. Weight loss f. Headaches g. Learning difficulties h. Behavior problems V. Other, specify ____ | <p>6a. Pada ____ apa saja masalah kesehatannya?</p> <ol style="list-style-type: none"> a. Masalah pernapasan b. Masalah kulit c. Diare d. Sakit pada area perut e. Turun berat badan f. Sakit kepala g. Kesulitan belajar h. Masalah perilaku V. Lainnya, sebutkan ____ |

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| <p>6b. What are the health effects for ____?</p> <ul style="list-style-type: none">a. Respiratory problemsb. Skin problemsc. Diarrhead. Abdominal paine. Weight lossf. Headachesg. Learning difficultiesh. Behavior problemsV. Other, specify ____ | <p>6b. Pada ____ apa saja masalah kesehatannya?</p> <ul style="list-style-type: none">a. Masalah pernapasanb. Masalah kulitc. Diared. Sakit pada area perute. Turun berat badanf. Sakit kepalag. Kesulitan belajarh. Masalah perilakuV. Lainnya, sebutkan ____ |
| <p>6c. What are the health effects for ____?</p> <ul style="list-style-type: none">a. Respiratory problemsb. Skin problemsc. Diarrhead. Abdominal paine. Weight lossf. Headachesg. Learning difficultiesh. Behavior problemsV. Other, specify ____ | <p>6c. Pada ____ apa saja masalah kesehatannya?</p> <ul style="list-style-type: none">a. Masalah pernapasanb. Masalah kulitc. Diared. Sakit pada area perute. Turun berat badanf. Sakit kepalag. Kesulitan belajarh. Masalah perilakuV. Lainnya, sebutkan ____ |

Section F. Lead risk reduction / Mengurangi risiko timbal

| | |
|--|---|
| <p>1. Has there been any health program/promotion related to lead in your community?</p> <ol style="list-style-type: none"> 1. Yes, it was about _____ promoted by _____ 2. No → question 4 3. Not sure → question 4 | <p>1. Apakah pernah/sedang ada program/sosialisasi kesehatan terkait timbal di tempat tinggal Bapak/Ibu?</p> <ol style="list-style-type: none"> 1. Ya, tentang _____ dilakukan oleh _____ 2. Tidak → pertanyaan 4 3. Tidak tahu → pertanyaan 4 |
| <p>2. If yes, do you practice the promoted measure in the health program/promotion ?</p> <ol style="list-style-type: none"> 1. Yes, because _____ 2. No, because _____ | <p>2. Jika ya, apakah Bapak/Ibu melakukan apa yang disampaikan dalam program/sosialisasi tersebut?</p> <ol style="list-style-type: none"> 1. Ya, karena _____ 2. Tidak, karena _____ |
| <p>3. What do you think of the program/promotion in preventing people from lead exposure?</p> <ol style="list-style-type: none"> 1. Very helpful 2. Helpful 3. Not helpful 4. Not helpful at all 5. Not sure | <p>3. Apa pendapat Bapak/Ibu tentang program/sosialisasi pencegahan paparan timbal tersebut?</p> <ol style="list-style-type: none"> 1. Sangat membantu 2. Membantu 3. Tidak membantu 4. Tidak membantu sama sekali 5. Tidak tahu |
| <p>4. What do you think are effective programs/promotions to prevent lead exposure?</p> <ol style="list-style-type: none"> 1. Effective programs/promotions <ol style="list-style-type: none"> a. _____ b. _____ c. _____ 2. Do not know | <p>4. Menurut Bapak/Ibu, program/sosialisasi apa saja yang efektif untuk mencegah paparan timbal?</p> <ol style="list-style-type: none"> 1. Dengan cara <ol style="list-style-type: none"> a. _____ b. _____ c. _____ 2. Tidak tahu |

Section G. Sociodemographic / Profil sosiodemografis

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|---|--|
| <p>1.Respondent's age: ____</p> | <p>1. Usia responden: ____</p> |
| <p>2.Respondent's sex</p> <ol style="list-style-type: none"> 1. Female 2. Male | <p>2. Jenis kelamin responden</p> <ol style="list-style-type: none"> 1. Perempuan 2. Laki-laki |
| <p>3.Duration of living in the area:</p> <ol style="list-style-type: none"> 1. Born here 2. Moved here since ____ | <p>3. Sudah berapa lama tinggal di desa ini:</p> <ol style="list-style-type: none"> 1. Lahir di sini 2. Pindah ke sini sejak ____ |
| <p>4.How many children live with you?</p> <ol style="list-style-type: none"> a. Children under 5 <input type="checkbox"/> b. Children 5 - 12 yo <input type="checkbox"/> c. Children 12 - 18 yo <input type="checkbox"/> | <p>4. Berapa banyak anak yang tinggal dengan Bapak/Ibu?</p> <ol style="list-style-type: none"> 1. Anak-anak umur di bawah 5 tahun <input type="checkbox"/> 2. Anak-anak umur 5-12 tahun <input type="checkbox"/> 3. Anak-anak umur 12-18 tahun <input type="checkbox"/> |
| <p>5.Compared to other children in your community, how do you see your children's development?</p> <ol style="list-style-type: none"> 1. More advanced 2. The same 3. Left behind <p>Why? _____</p> | <p>5. Dibandingkan dengan anak-anak lain di tempat tinggal Bapak/Ibu, bagaimana Bapak/Ibu melihat perkembangan anak Bapak/Ibu?</p> <ol style="list-style-type: none"> 1. Lebih maju 2. Sama 3. Tertinggal <p>Mengapa? _____</p> |

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| <p>6. What sector is your occupation?</p> <ol style="list-style-type: none"> 1. Home industry owner/worker 2. ULAB smelting owner/worker 3. Farm 4. Construction worker 5. Trading 6. Services - government 7. Services - health 8. Services - education 95. Others, please specify _____ | <p>6. Apa sektor pekerjaan Bapak/Ibu?</p> <ol style="list-style-type: none"> 1. Pemilik/pekerja industri rumah tangga 2. Pemilik/pekerja peleburan aki bekas 3. Pertanian 4. Pekerja bangunan 5. Penjual 6. Layanan - pemerintah 7. Layanan - kesehatan 8. Layanan - pendidikan 95. Lainnya, _____ |
| <p>7. Have you ever worked in the ULAB recycling industry (e.g. smelter, seller)?</p> <ol style="list-style-type: none"> 1. Yes, as smelter 2. Yes, as ULAB seller 3. Yes, as _____ 4. No | <p>7. Apakah Bapak/Ibu pernah bekerja di industri pengolahan aki (misalnya: peleburan, penjual, distributor)?</p> <ol style="list-style-type: none"> 1. Ya, sebagai pelebur 2. Ya, sebagai penjual aki 3. Ya, sebagai _____ 4. Tidak |
| <p>8. Have you got anything to ask us?</p> <p>_____</p> | <p>8. Apakah Bapak/Ibu ada pertanyaan yang ingin ditanyakan pada kami? _____</p> |

----END OF SURVEY----

Annex 2. Study Team

| | |
|--------------------|---|
| Project director | Iqbal Abisaputra |
| Team leader | Frisca Tobing |
| Technical advisors | Dr. Dee Jupp |
| Quality assurance | Danielle Stein |
| Qualitative team | Deborah Tobing Frisca Tobing Iqbal Abisaputra Krisman Pandiangan Riz Adhima Zaenatul Nafisah Zakiyah Derajat |
| Quantitative team | Upik Sabaingrum Asti Januarti Ade Mulyana Agung Prabowo Akhmad Zainal Mubarak Elok Anggraini Faidah Mardika M Ekazaki Kurnia Mulyana Sarah Monica Septian Suhandono Stephanie Woro Narriswari Zaenatul Nafisah Zakiyah Derajat |

The qualitative fieldwork team included seven researchers, including four senior researchers. All have joined previous Empatika studies and have participated in Empatika's Immersion Research Level 1 training, which includes modules on ethics and child safeguarding. All researchers have also completed UNICEF's Prevention of Sexual Exploitation and Abuse (PSEA) training.

The quantitative team included eleven enumerators and two senior quantitative researchers as survey coordinator for each location. All enumerators were trained based on a field manual incorporating both supervision and quality assurance measures.

Where possible, the same researchers conducted both the pFGDs and the survey. Doing so improved the quality of the overall research by ensuring that researchers had sufficient contextual knowledge to follow-up on topics or conversations that were not able to be captured in the survey during Phase 3.

UNICEF Indonesia
WTC 2, 22nd floor
Jl. Jenderal Sudirman Kav. 29-31
Jakarta 12920, Indonesia
+62 21 5091 6100
jakarta@unicef.org
www.unicef.org