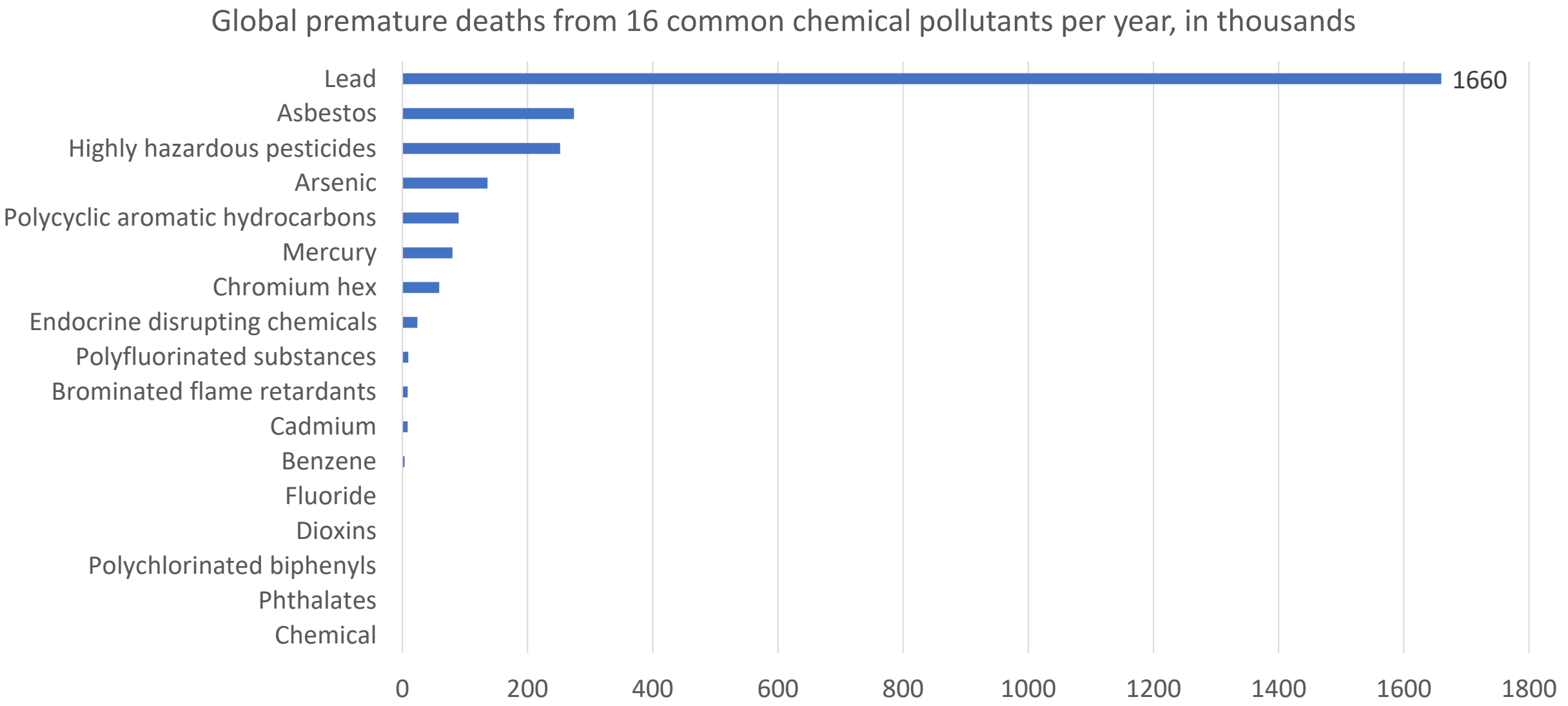
A Toxic Threat to Indonesia's Human Capital

Prevalence and impact of lead paint in Indonesian homes

June 2025

Lead is an immensely damaging environmental toxin



Marti et. al. 2024

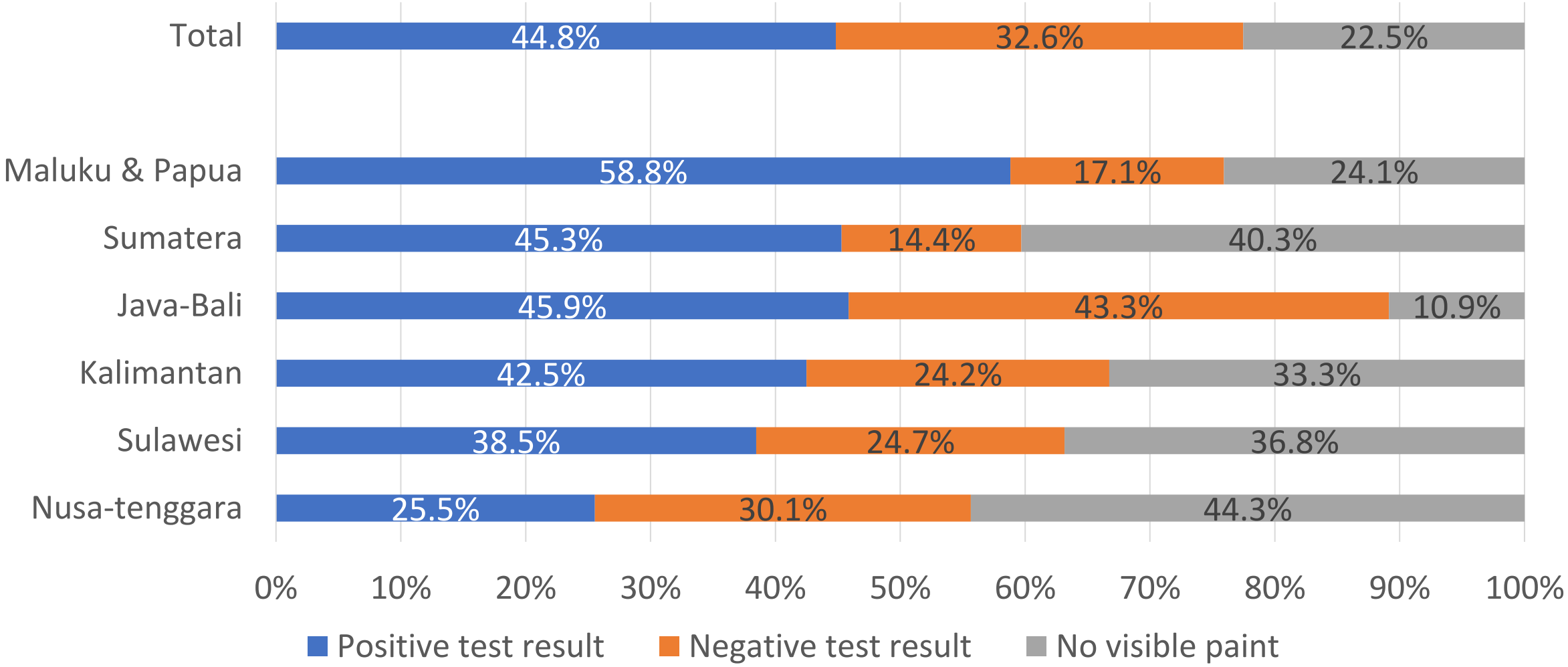
Lead poisoning is an urgent health threat in Indonesia, and around the world

- We lack nationally representative statistics on Pb poisoning in Indonesia.
- But GBD database estimates Pb-exposure killed about 27 thousand Indonesians in 2019, loss of about 711 thousand disability adjusted life years.
  - Suggests Indonesia is the world's fourth most affected country.
  - If correct, lead kills more people per year in Indonesia than traffic fatalities (!)
  - A greater loss of health than total cases of blindness and deafness
- As many as 12 million Indonesian children have blood lead levels above 5 µg/dL (Rees & Fuller 2020)
  - On average permanently lower IQ by between 3.2 and 3.8 points.
  - Crawford et. al. (2023): may account for a quarter of that IDN's learning gap
- Using value of a statistical life, Pb costs Indonesia $PPP 32 to 64 billion per year in health and disability
  - About .8 to 1.7 percent of GNI in 2023.
  - Outweigh the total projected 2025 State health budget, by about 30 percent

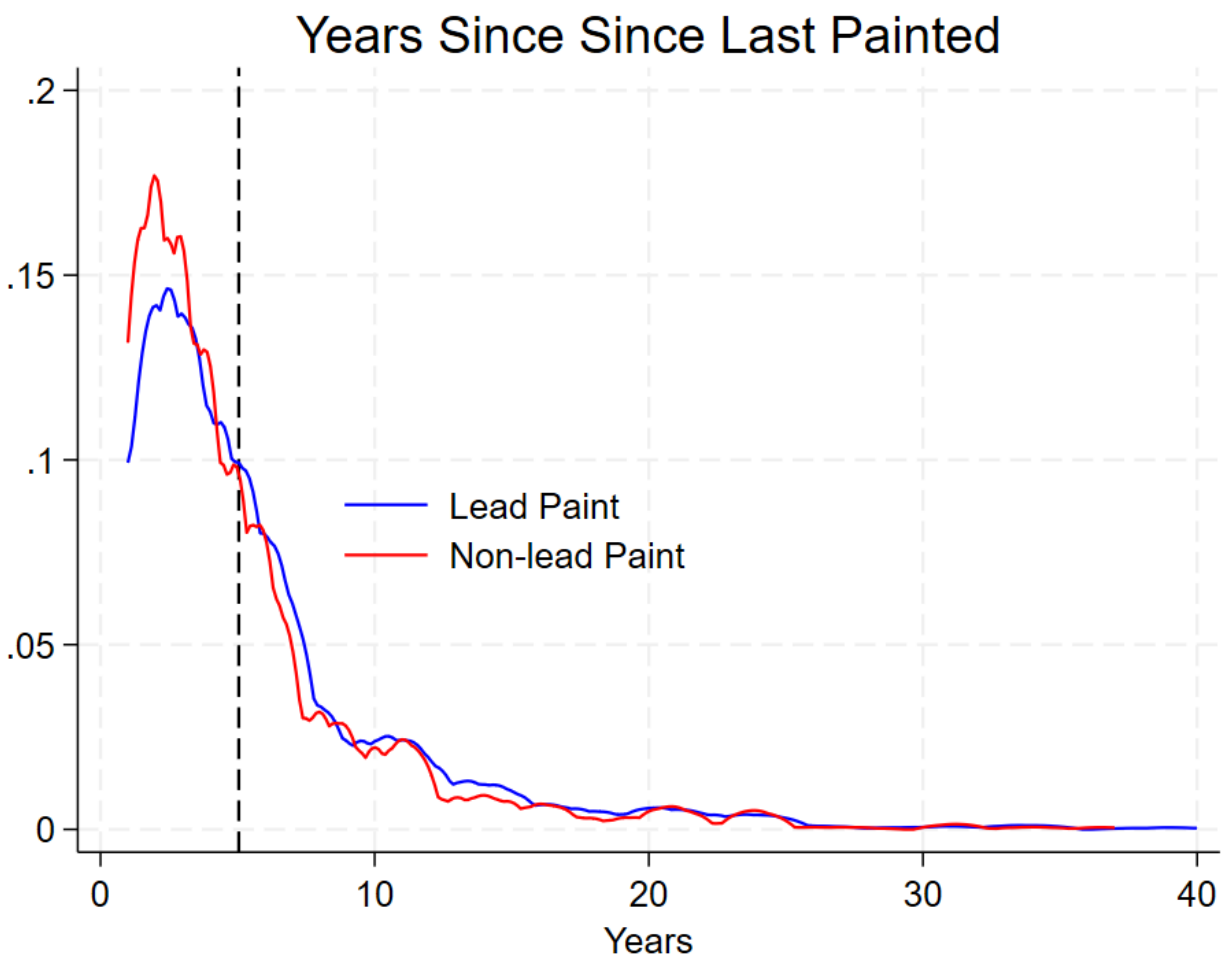
We tested paint for lead in a nationally representative household survey

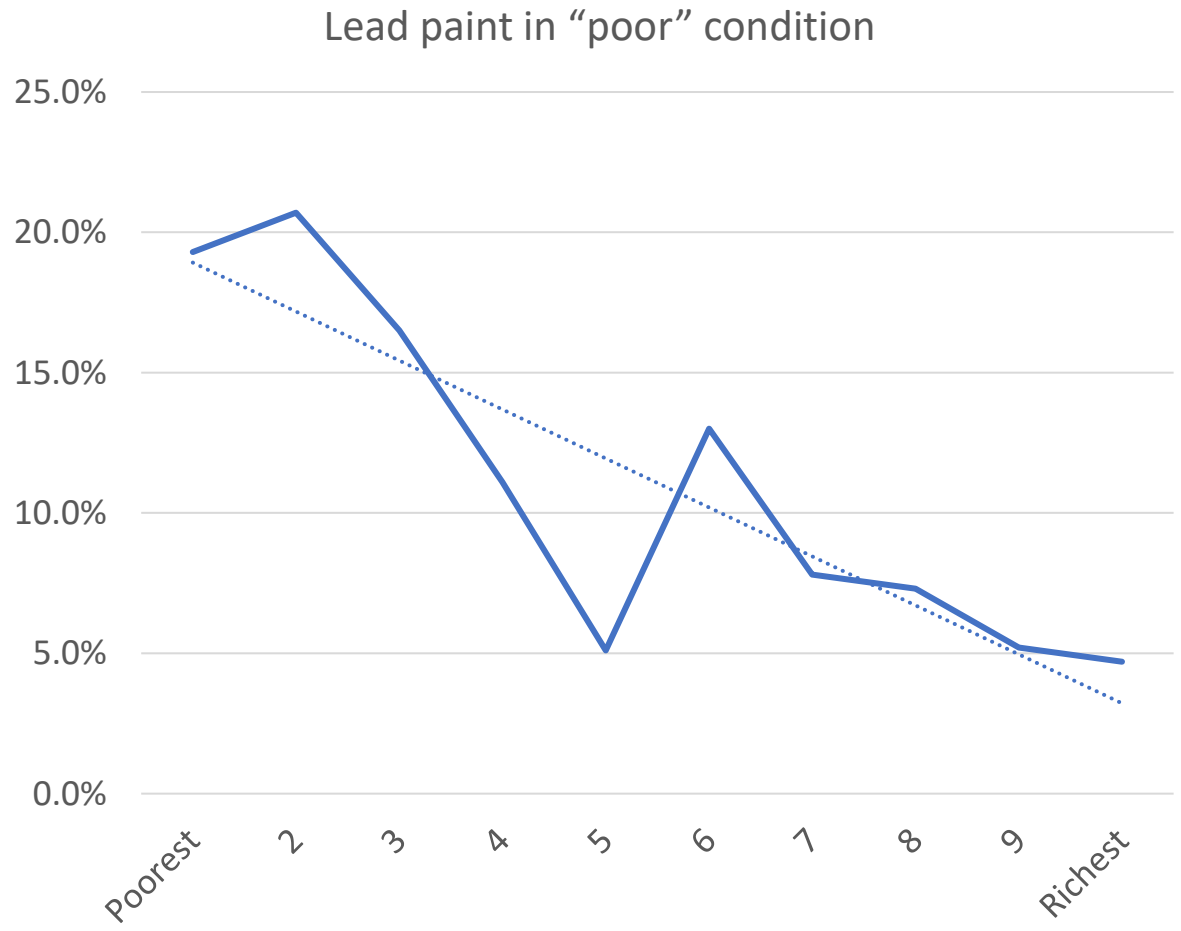
- We found 44.8 percent of Indonesians live in homes with paint that tests positive for Pb using chemical swab tests.
  - Including about 46 percent aged five or younger—about 10.2 million children.
- Deteriorating lead paint exposes 14.1 of children aged five or younger to high risks, more than twice as often for the poorest 40 percent.
- Model-based estimates find paint alone may push 21 percent of children aged 0-5 over the 5 µg/dL blood lead threshold.
  - Equivalent to more than half (55 percent) of total estimated child cases in Indonesia.

How much exposure in Indonesian homes?



The condition of lead paint in Indonesian homes?

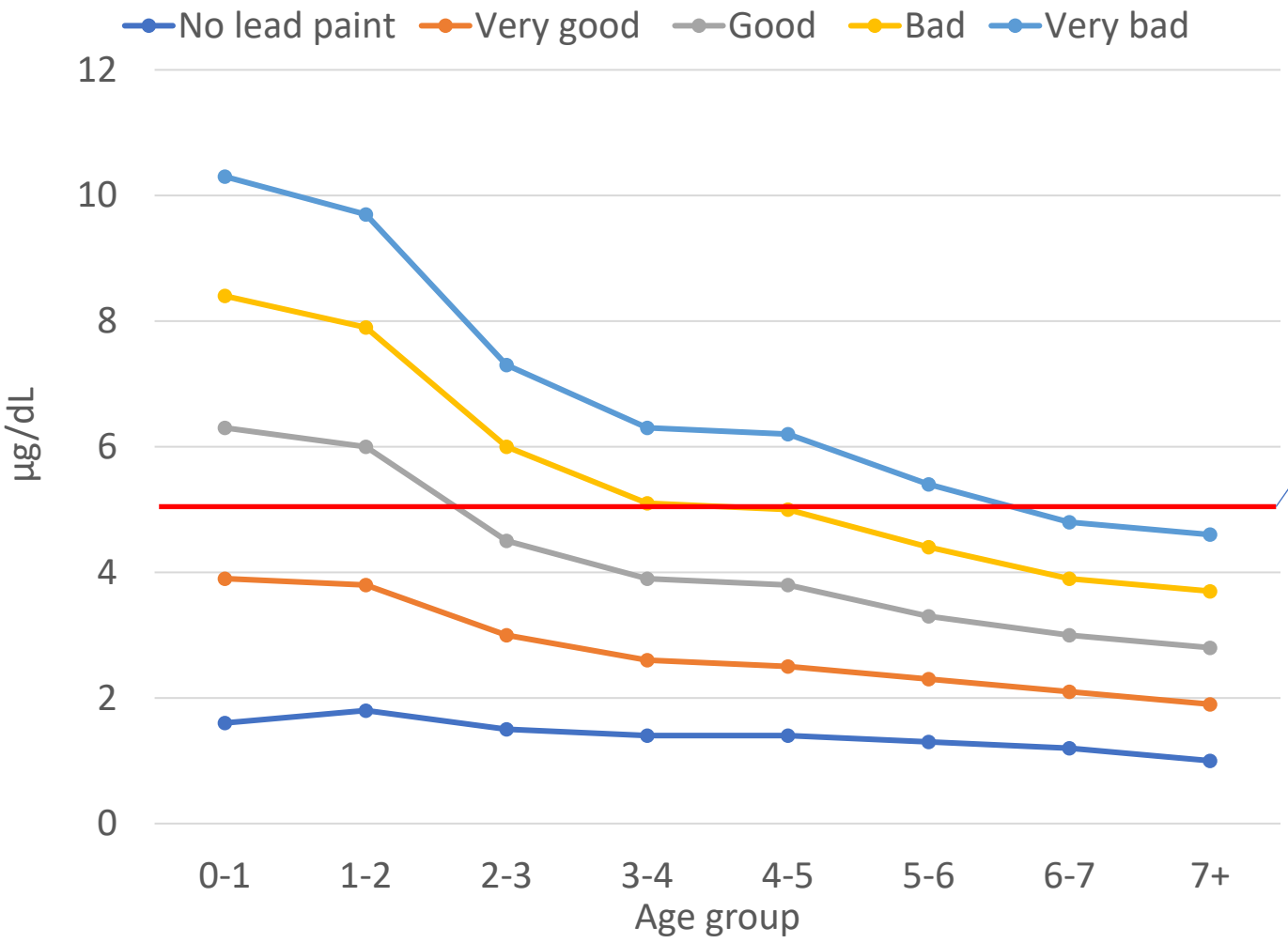




Simulating children's blood lead levels due to lead paint exposure

- Integrated Exposure Uptake Biokinetic Model for Lead in Children (EPA, 2020)
- Initially set default values rely on empirical estimates
  - Real-world lead uptake and biokinetics
  - Contact and intake rates of children with contaminated sources
  - Data on behavior of environmental lead
- The indoor dust parameter most important for lead paint
  - Estimated as the background soil lead, or…
  - in the case of lead-based painted dwelling, exposure from lead dust in the home.
- The baseline for exposure from lead paint in the home is 1200 µg/g (US EPA, 1986; US HUD 1995). Model calibration varying from 400-1600 µg/g depending on paint deterioration conditions.
  - 64 µg/g if no paint, or paint tested negative for lead (background exposure as estimated by Sekarningsih et. al., 2021)
  - 400 µg/g if reported in "very good" condition to 1,600 µg/g if reported in "very bad" condition

Model results by condition of lead paint in the home

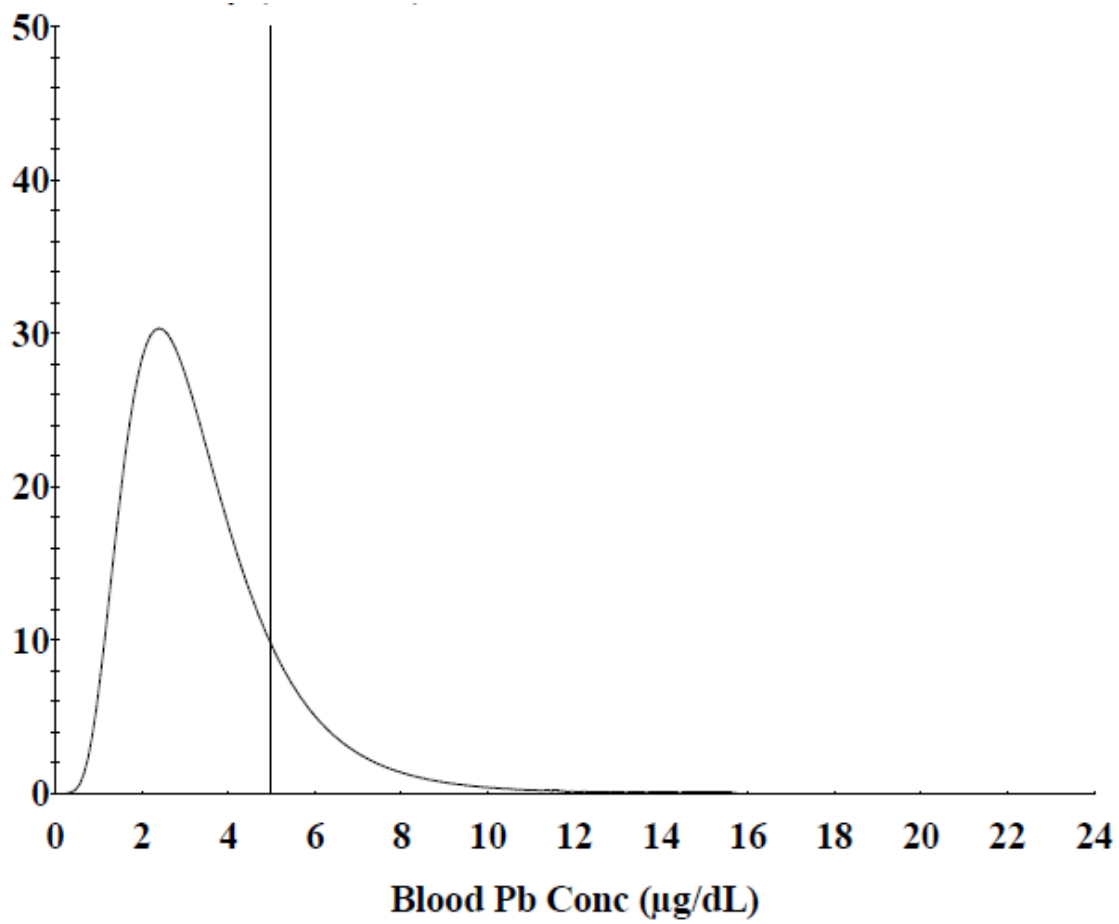


5 µg/dL is the level at which an affected child would be expected to lose between 3.2 and 3.8 IQ points

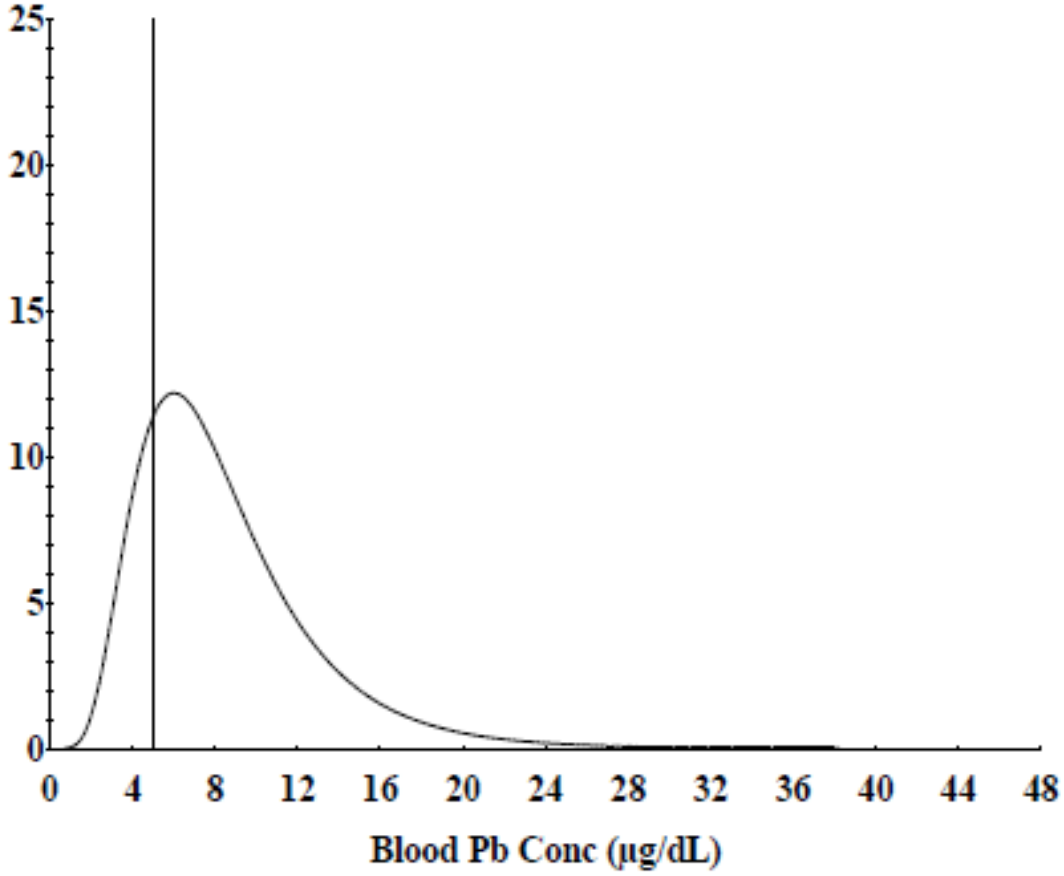
Chronic exposure even at lower concentrations have health effects that accumulate over a person's lifetime. Can account for more than 70 percent of the total health costs poisoning.

Model-based blood lead distributions, age 0-5

Paint in very good condition



Paint very bad condition



Lead use is strictly regulated in many countries but not in Indonesia

- A series of paint studies found many varieties still contain lead.
- Indonesia has no lead paint ban
- In Indonesia, paints are categorized under the voluntary standards, Compliance is not mandatory for manufacturers or importers.
- There are affordable alternatives for all uses of lead in paint.
  - Safe, affordable alternatives for color, fast-drying, and corrosion resistance
- There are already lead-free paints produced in Indonesia.
  - Thank you Mowilex!
  - But Ismawati et. al. (2021) quote producers as unwilling to switch until mandated

There are clear short- and medium-term priorities for World Bank engagement in Indonesia

- Support ban lead in paint above concentrations of 90 ppm, develop enforcement
- Assist Indonesian paint producers to switch to safe alternatives
- Conduct a nationally representative BLL survey to obtain precise to close awareness gap.
  - In the BPJS sample data for 2023, not a single case of lead poisoning.
- Support Launch national surveillance of blood lead levels, especially for children
  - Introduce capillary (finger-prick) tests, currently unavailable in IDN
- Consider buy-back programs to prevent paint on the market from being used. Far more costly to remediate than to simply prevent.
- Public awareness campaigns are key: essential to avoid severe poisoning from demolitions/maintenance.
- Create a strategy for a national abatement program, especially for high-risk cases (daycare centers, poor households, etc.).

Thank you!

Please contact us for questions or comments

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