



Environmental, Food, and Human Body Burden of **Dechlorane Plus** in a Waste Recycling Area in Thailand **No Room for Exemptions**



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Dechlorane Plus

- ❑ a polychlorinated flame retardant
- ❑ Used in electrical wire and cable coatings, plastic roofing materials, connectors in TV and computer monitors, and non-plasticizing flame retardant in polymeric systems, such as nylon and polypropylene plastic
- ❑ Regrettable substitution for Polybrominated Diphenyl Ethers (esp. DecaBDE) since its listing for global elimination

Dechlorane Plus

- ❑ Adverse effects on environment, animals and human health
- ❑ Oxidative damage, indications of neurodevelopmental toxicity, potential endocrine disruptor
- ❑ Bioaccumulates, and have long range transportation potential
- ❑ Therefore, POPRC recommended its listing in **Annex A** of the **Stockholm Convention** this year
- ❑ But with **exemptions** for use and production, potentially lasting till 2044

Materials and Methods



□ Samples collected at various stages of e-waste processing

1. **Dismantling of e-waste** in workshops
2. **Sorting and grinding** of waste plastic in shredding workshops
3. **Transportation** of non-utilizable leftovers to a **dumpsite** to be **burned**
4. **Ash** from dumpsite brought back to workshop and processed (again)

E-waste Site in Thailand















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Control Site



- ❑ Environmental samples and foodstuff collected from organic farm with **no e-waste activity** nearby
- ❑ Blood samples collected from farmers working in or living in the same village as the farm – **none has done e-waste recycling**
- ❑ Control eggs bought from supermarkets in another area

Samples Collected

- | | |
|------------------------------------|-----------------|
| 1. Dust | 6. Rice |
| 2. Soil | 7. Fish |
| 3. Sediment | 8. Snail |
| 4. Ash | 9. Crab |
| 5. Waste (shredded plastic pieces) | 10. Eggs |
| | 11. Blood serum |



Results

| | Unit | N | > LOQ | min | max | median | mean |
|---------------------------|-----------------|----|-------|-------|-------|--------|-------|
| Dust | ng/g dry matter | 22 | 95 % | 0.005 | 108 | 10.2 | 18.8 |
| Soil | ng/g dry matter | 9 | 56 % | 0.005 | 4.9 | 0.08 | 0.80 |
| Sediment | ng/g dry matter | 2 | 100 % | 0.24 | 15.4 | 7.8 | 7.8 |
| Ash | ng/g dry matter | 1 | 100 % | 1.7 | 1.7 | 1.7 | 1.7 |
| Waste | ng/g | 2 | 0 % | 0.005 | 0.005 | 0.005 | 0.005 |
| Rice | ng/g | 1 | 0 % | 0.005 | 0.005 | 0.005 | 0.005 |
| Fish¹ | ng/g | 7 | 86 % | 0.002 | 0.10 | 0.02 | 0.04 |
| Snails² | ng/g | 4 | 75 % | 0.002 | 0.03 | 0.01 | 0.02 |
| Crabs³ | ng/g | 3 | 0 % | 0.002 | 0.002 | 0.002 | 0.002 |
| Eggs | ng/g lipid | 7 | 71 % | 0.15 | 12.6 | 0.97 | 3.9 |
| Blood | ng/g lipid | 40 | 85 % | 0.30 | 89.30 | 7.27 | 12.57 |

N – number of samples

> LOQ – samples with concentrations above LOQ

¹Climbing perch, climbing gourami (*Anabas testudineus*), Broadhead catfish (*Clarias macrocephalus*), Nile Tilapia (*Oreochromis niloticus*)

²Apple snail (*Pomacea canaliculata*)

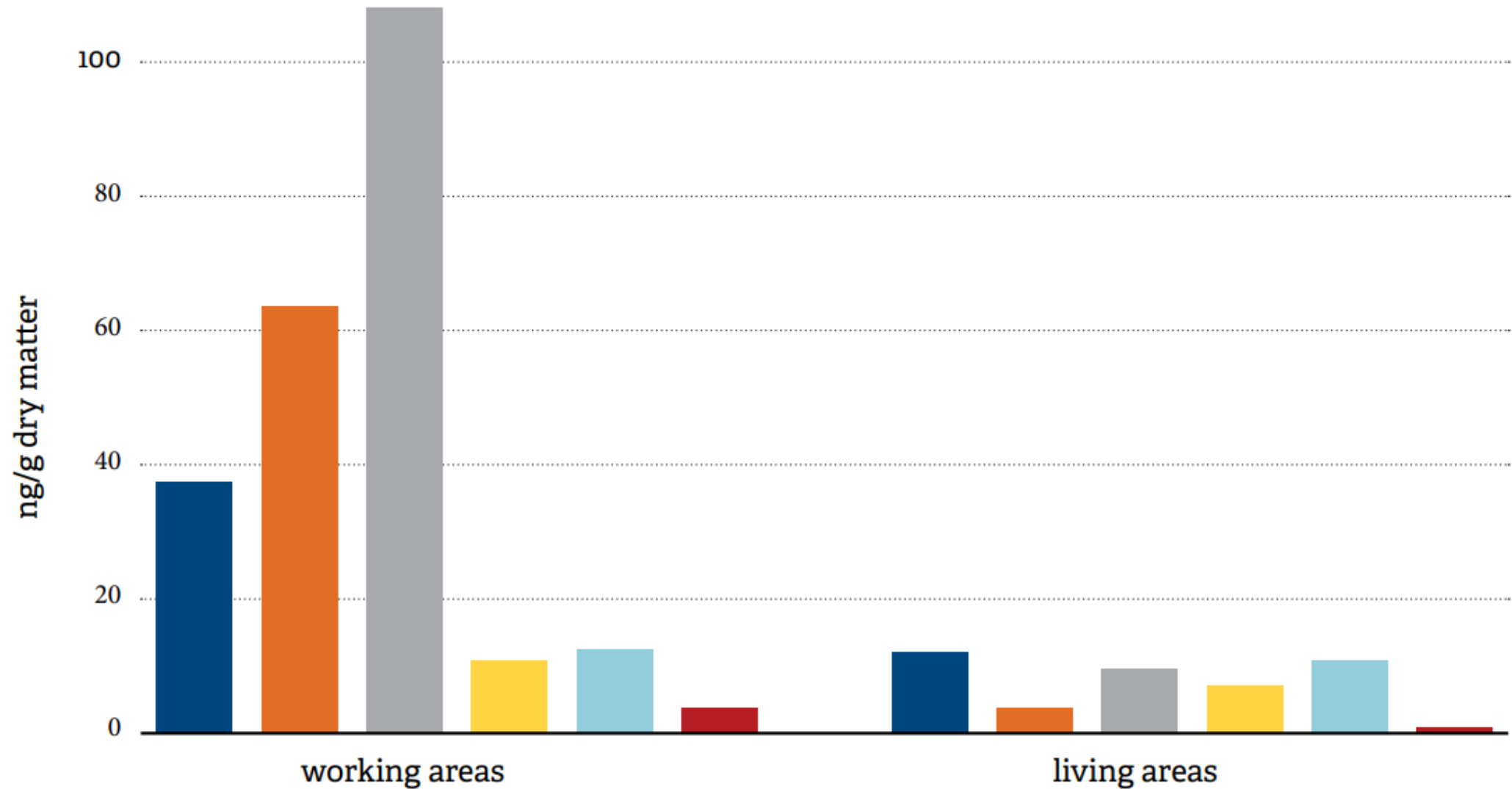
³Thai rice field crab (the genus *Esanthelphusa* could be identified)

Environmental Samples



- ❑ E-waste dismantling/
recycling are a source of
Dechlorane Plus in
household dust
- ❑ Dechlorane Plus was
detected in the dust of a
workshop that stopped e-
waste operations 10
years ago

Difference in concentration of **Dechlorane Plus** in **dust** of working areas and living areas of e-waste workers

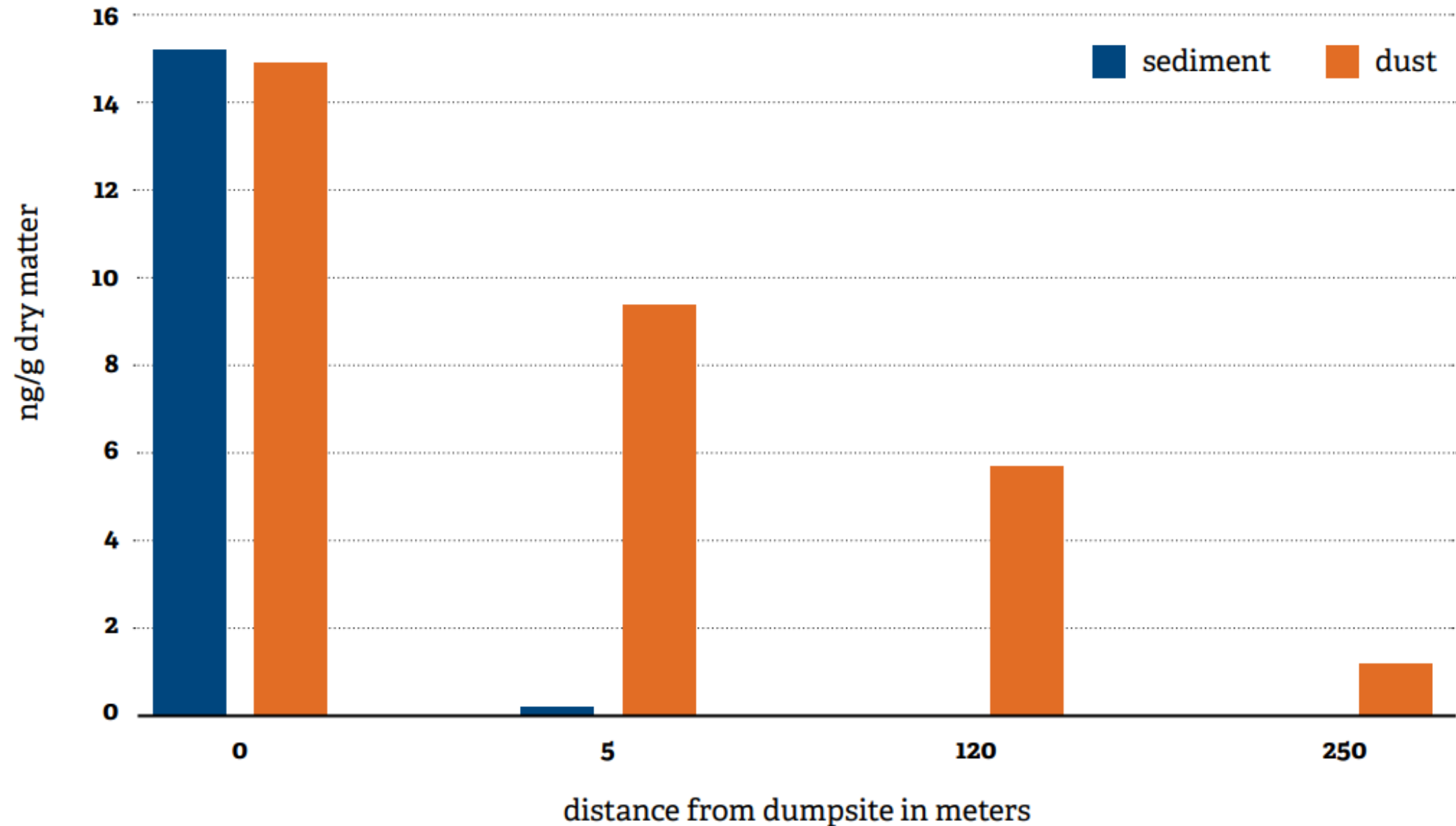




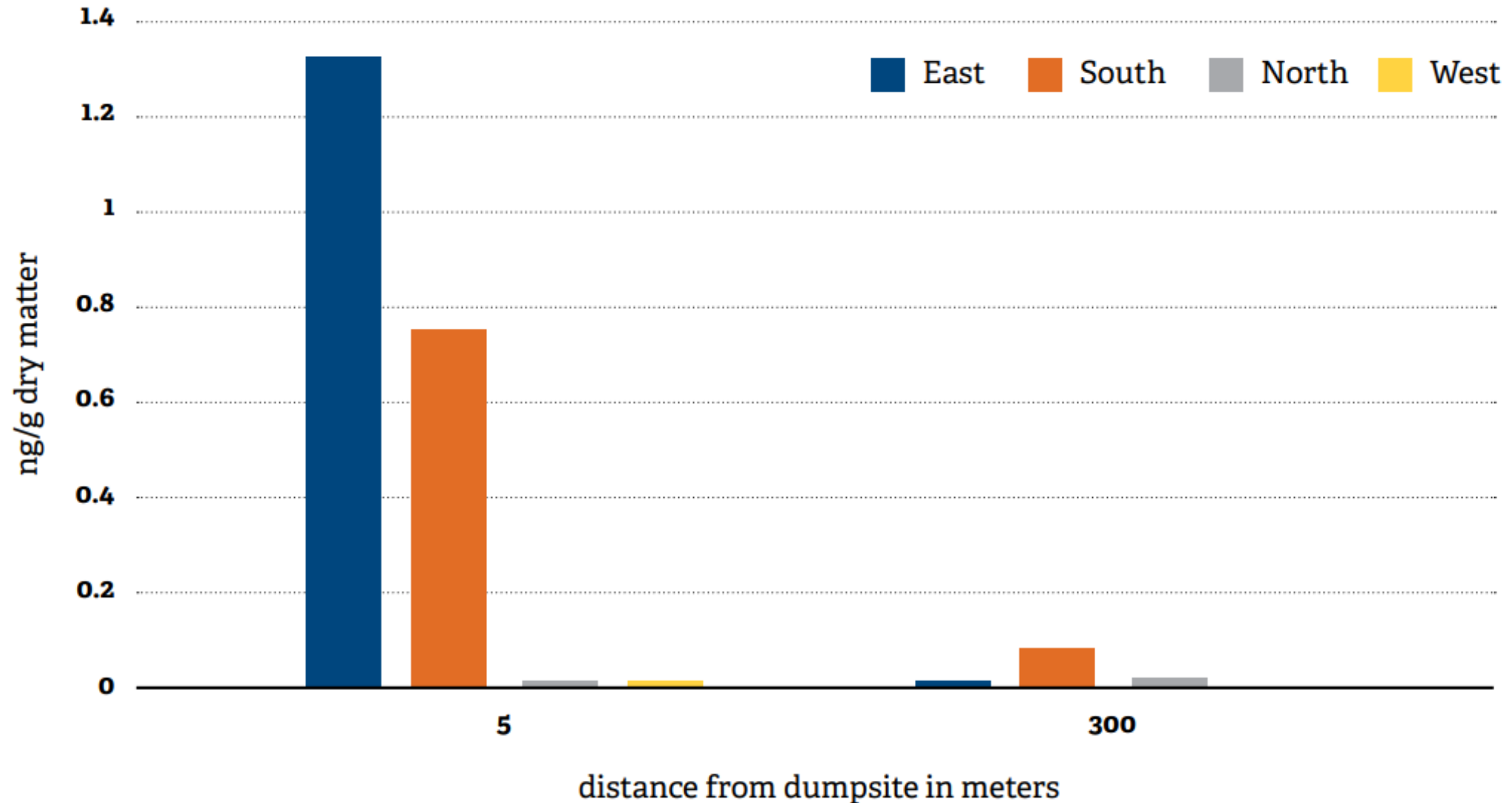
Environmental Samples

- ❑ Transport, storage, and shredding of various types of **plastic residues** is a source of Dechlorane Plus contamination of the outdoor environment
- ❑ The **dumpsite and the traffic of waste** associated with it is a source of contamination of Dechlorane Plus in the surrounding environment

Reduction in concentration of **Dechlorane Plus** in **sediment** and **dust** as distance from **dumpsite** increases



Reduction in concentration of **Dechlorane Plus** in **sediment** and **dust** as distance from **dumpsite** increases

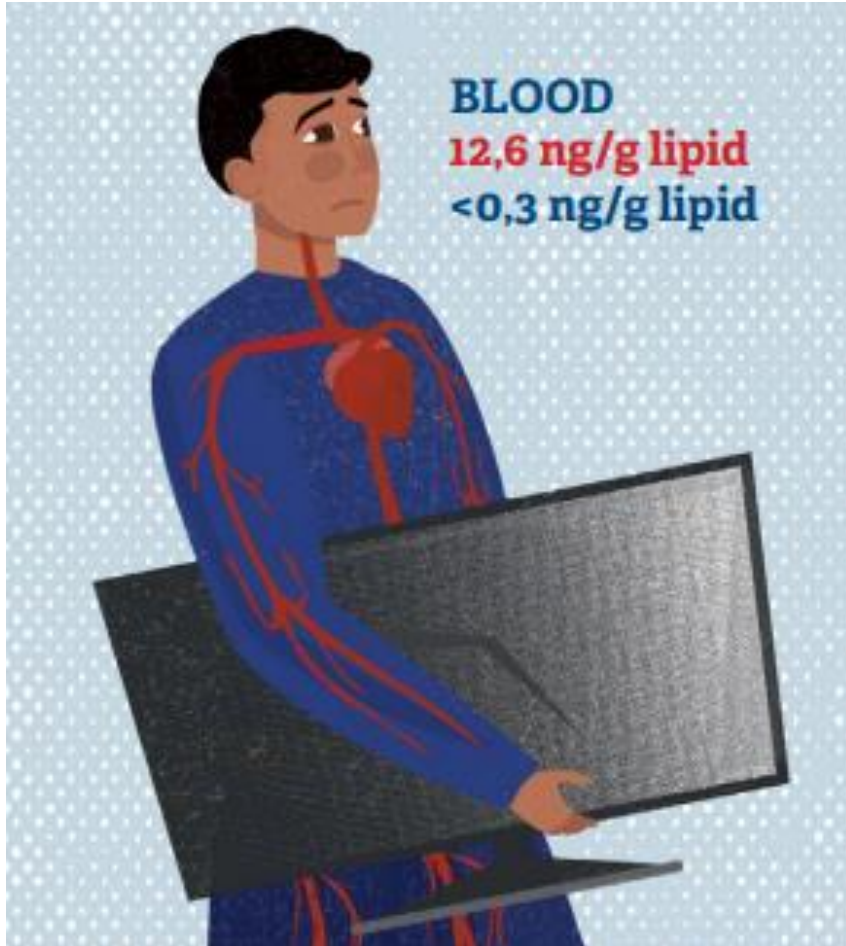


Foodstuff

- ❑ The dumpsite might be a source of contamination of foodstuff in surrounding areas, i.e., **snail** and **fish**
- ❑ E-waste and End-of-Life-Vehicles recycling are a source of dechlorane plus contamination in chicken eggs



Worker's Blood



- ❑ Control group: 1 out of 26 has Dechlorane Plus in blood serum exceeding LOQ
- ❑ E-waste workers: 34 out of 40 (85%) has Dechlorane Plus in blood serum exceeding LOQ
- ❑ The results of our study clearly link Dechlorane Plus levels in Thai e-waste workers with recycling activities in their communities

Sources and levels of Dechlorane Plus exposure to workers in the recycling sector in northeastern Thailand compared to background concentrations



APPLE SNAIL
0,02 ng/g
<0,01 ng/g



FISH
0,04 ng/g
<0,01 ng/g



SOIL
0,8 ng/g d.w.
<0,01 ng/g d.w.



RICE
<0,01 ng/g
<0,01 ng/g

BLOOD
12,6 ng/g lipid
<0,3 ng/g lipid



SEDIMENT
7,8 ng/g d.w.
<0,01 ng/g d.w.



ASH
1,7 ng/g d.w.
<0,01 ng/g d.w.



DUST
18,8 ng/g d.w.
<0,01 ng/g d.w.



EGGS
1,7 ng/g lipid
<0,3 ng/g lipid



CRAB
<0,003 ng/g



Conclusion

- ❑ Continued use of **Dechlorane Plus** will continue the exposure of e-waste workers in Thailand and other places to this dangerous chemical
- ❑ It is time to list Dechlorane Plus in Annex A **with no exemptions**
- ❑ **Labeling of products** that contain Dechlorane Plus so that Parties can identify these substances in products and wastes and fulfill requirements under Article 6

Thank You



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