Lead Paint Alliance Toolkit for Establishing Laws to Control the Use of Lead in Paint

Patrick Huber

US Environmental Protection Agency

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Outline

- Overview of the Toolkit
- Module Bi: Health impacts
- Module Biii: Economic impacts

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Overview of the Toolkit

- Provides information on health and environmental concerns
- Explains test methods
- Describes existing paint market
- Shows how to establish laws
- Structure:
  - Understanding the Problem
  - Identifying the Market
  - Taking Action

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Understanding the Problem

Modules in this section:

- Module A. Lead Paint and the Problem
- Module B.i. Health Hazards of Lead
- Module B.ii. Environmental Impact of Lead
- Module B.iii. Economic Impact
- Module C.i. Analytical Methods for Measuring Lead in Blood
- Module C.ii. Analytical Methods for Measuring Lead in Paint

Identifying the Market

Modules in this section:

- Module D. Industry Perspective on the Elimination of Lead Paint
- Module E. Alternatives to Lead in Paint
- Module F. Summary of Lead in Paint Testing in Developing Countries
- Module G. Challenges for Small and Medium Paint Manufacturers

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Taking Action

Modules in this section:

- Module H (i-iv). 4 Case Studies on Existing Lead Paint Laws (European Union, United States, Uruguay and Philippines)
- Module I. Conducting lead awareness-raising campaigns
- Module J. Developing Legal Limits on Lead in Paint

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Module Bi

Health Hazards of Lead

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Sources of lead release

Natural (volcanic, weathering of rocks)

Anthropogenic sources:

- mobilization of lead in raw materials such as fossil fuels and other extracted and treated ores and metals
- direct releases from waste to soil and aquatic environments
- releases during the manufacture, use and disposal of products using lead (e.g. **paint**, batteries, toys)
    - prior to the removal of lead from gasoline in most countries, leaded gasoline was a significant source of lead

Lead is mainly emitted in particle form, is transported through the atmosphere and settles on soil, plants, water etc

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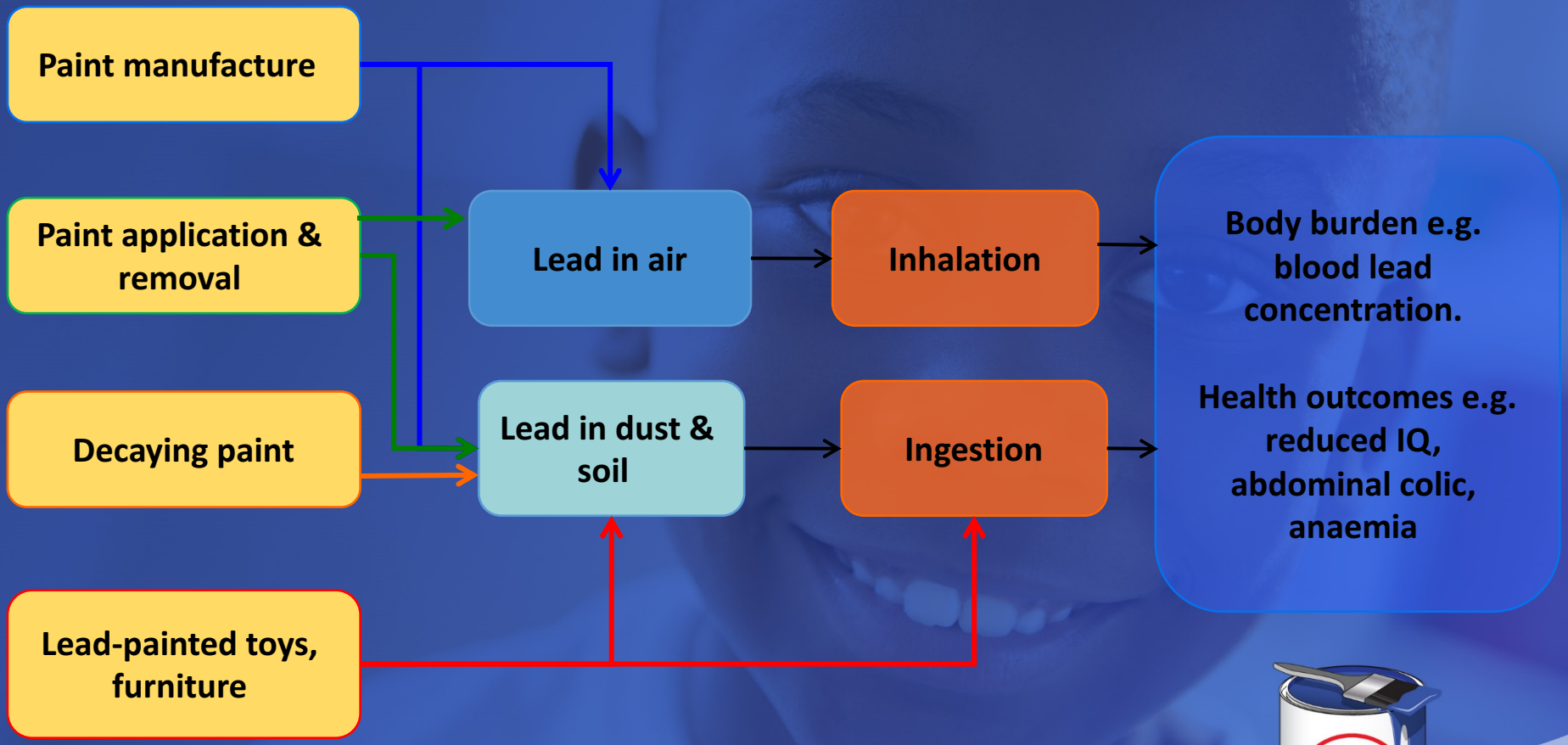
Multiple pathways of exposure to lead from paint



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Ingestion is an important route of exposure for children

- Children may ingest contaminated dust and paint chips
- Children with pica are at particularly high risk – severe poisoning may occur
- Picture is a radiograph of a child with lead poisoning from eating lead paint, showing paint chips (white spots) dispersed throughout the gut

Figure 2 – A large quantity of lead paint chips can be seen in this radiograph of the abdomen and pelvis of a 2-year-old boy with lead poisoning.

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Lead accumulates in the body

Bound to red blood cells and distributes to soft tissues, e.g. brain and kidneys, and to bone

Stored in bone for many years (half-life = 10 – 25 years)

Lead in bone provides a pool from which lead can move back into blood and to target organs

e.g. during pregnancy, lactation and the menopause

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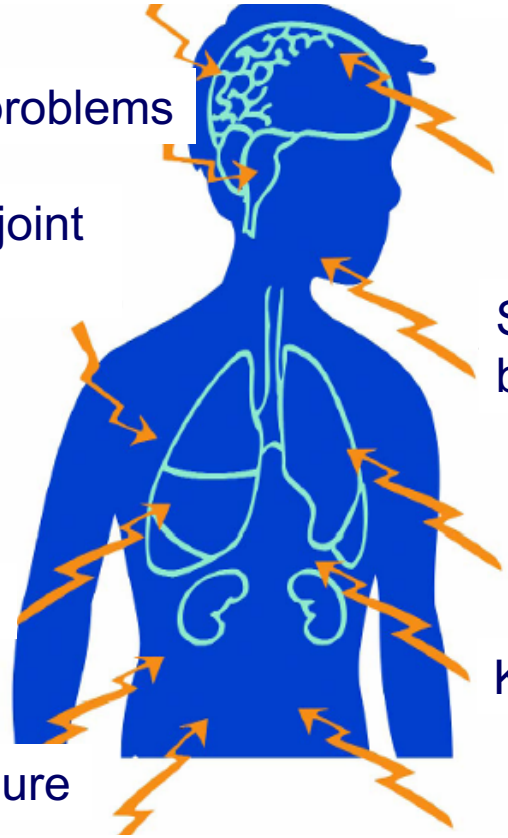
Lead is a multi-system toxicant



Brain & nervous system damage

Decreased IQ

Hearing problems

Learning difficulties

Muscle & joint pain

Speech, language and behaviour problems

Slow or reduced growth

Anaemia

Kidney damage

High blood pressure

Digestive problems

Reproductive problems (adults)

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No known threshold for toxic effects – US National Toxicology Program assessment of evidence

Table 1.1: NTP conclusions on health effects of low-level Pb by life stage

Life Stage	Blood Pb Level	NTP Conclusion	Principal Health Effects	Bone Pb Evidence
Children	<5 µg/dL	*Sufficient*	Decreased academic achievement, IQ, and specific cog-	Tibia and dentin Pb are associated with attention- nd cognition.
		Limited		ldren does not owth.
	<10 µg/dL	*Sufficient*	Delayed puberty, IQ, and decreased hea	
		Limited	Increased hypersensitivity allergens and increased Ig	
		Inadequate	*Any age* – asthma, eczema, cardiovascular	
Adults	<5 µg/dL	*Sufficient*	duced fe	e general pop- n bone Pb and reduced fetal growth.
		Limited	Increased incidence of essential tremor	No data
	<10 µg/dL	*Sufficient*	Increased blood pressure, increased risk of hypertension, and increased incidence of essential tremor	The association between bone Pb and cardiovascular effects is more consistent than for blood Pb.
		Limited	Psychological effects, decreased cognitive function, decreased hearing, increased incidence of ALS, and increased cardiovascular-related mortality; maternal blood Pb associated with increased incidence of spontaneous abortion and preterm birth	The association between bone Pb and cognitive decline is more consistent than for blood Pb.
		Inadequate	Immune function, stillbirth, endocrine effects, birth defects, fertility or time to pregnancy**, sperm parameters**	No data

Abbreviations: ALS, amyotrophic lateral sclerosis; IgE, immunoglobulin E; IQ, intelligence quotient

*Increased serum IgE is associated with hypersensitivity; however, as described in Section 1.4.3, increased IgE does not equate to disease.

**The NTP concludes that there is *inadequate* evidence that blood Pb levels <10 µg/dL are associated with fertility, time to pregnancy, and sperm parameters; however, given the basis of the original nomination, the NTP evaluated the evidence that higher blood Pb levels (i.e., >10 µg/dL) are associated with reproductive and developmental effects, and those conclusions are discussed in Section 1.4.6 and presented in Table 1.2.

(Reference 2)

Who is at risk? Children

Children have greater exposure:

- play on the ground, hand-to-mouth activity, mouthing objects
- absorb 4-5 times more lead from the gut than adults

Fetal period and early childhood are critical periods for neurological and other organ development

Damage to the neurological system may be permanent

- reduces a child's potential for intellectual development
- increases the likelihood of behavioural disorders

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Who is at risk? Pregnant women

Pregnancy mobilizes lead stored in bone, releasing it back into blood where it can be circulated to maternal tissues and the fetus

Increased risk of hypertension during pregnancy – may be greater risk of pre-eclampsia

Exposure of pregnant women can result in exposure of the fetus – may cause reduced fetal growth

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Lead causes significant burden of disease

- 853,000 deaths in 2013 from long-term effects
- Estimated to account for:
  - 9.3% of the global burden of idiopathic intellectual disability
  - 6.6% of the global burden of stroke
  - 4% of the global burden of ischaemic heart disease

(estimates by Institute for Health Metrics and Evaluation 2015)

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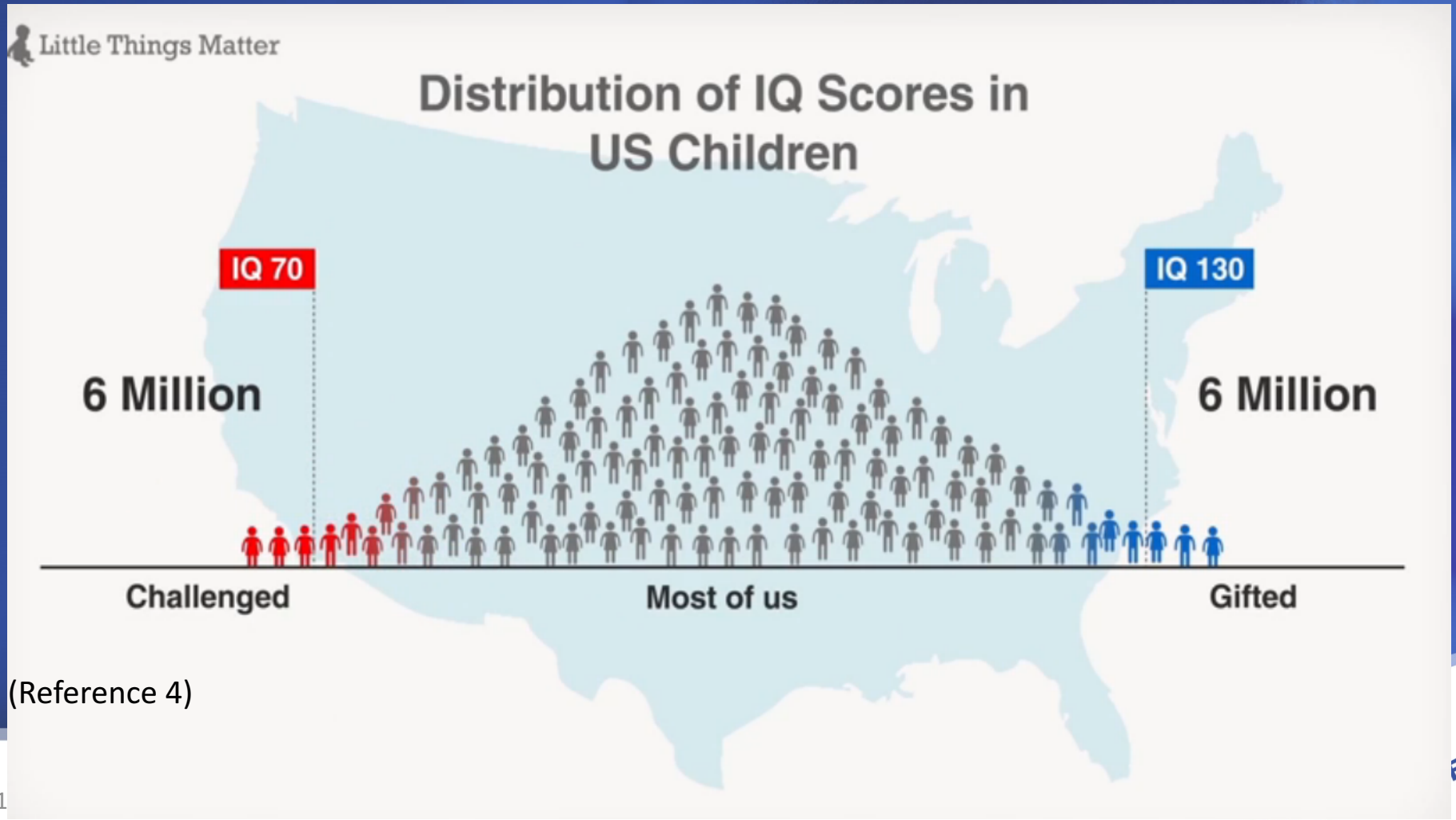
Small IQ reduction has significant societal impact (mean IQ 100)



(Reference 4)

Small IQ reduction has significant societal impact (mean IQ 95)

Module Biii?

Economic Impact of Childhood Lead Exposure

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Estimated Costs of Childhood Lead Exposure in Low- and Middle-Income Countries

- Total estimated cost in LMICs = $977 billion (range $728.6–1162.5 billion) of international dollars in 2008
- Regional economic losses estimated as:
  - Africa: $134.7 billion, i.e. 4.03% of regional GDP

- Source: Attina TM, Trasande L (2013) Economic Costs of Childhood Lead Exposure in Low- and Middle-Income Countries. Environ Health Perspect 121(9): 1097-110

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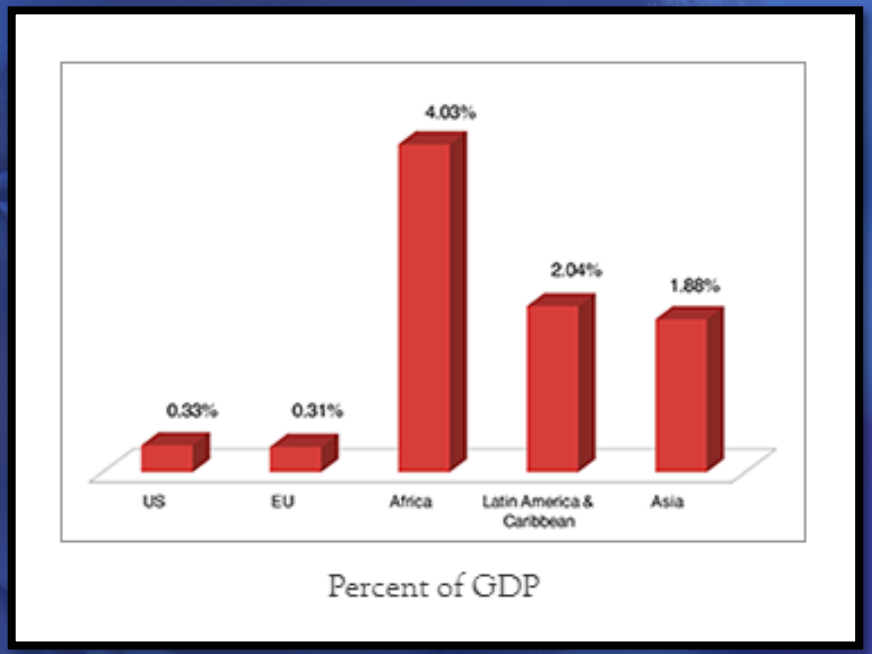
Developing Countries have been left behind

- Overall burden associated with childhood lead exposure in **LMICs** amounted to 1.20% of world GDP in 2011; approximately $977 billion international dollars in 2008
- For comparison, economic impact of lead exposure in the **U.S. and in EU** countries is $50.9 and $55 billion, respectively



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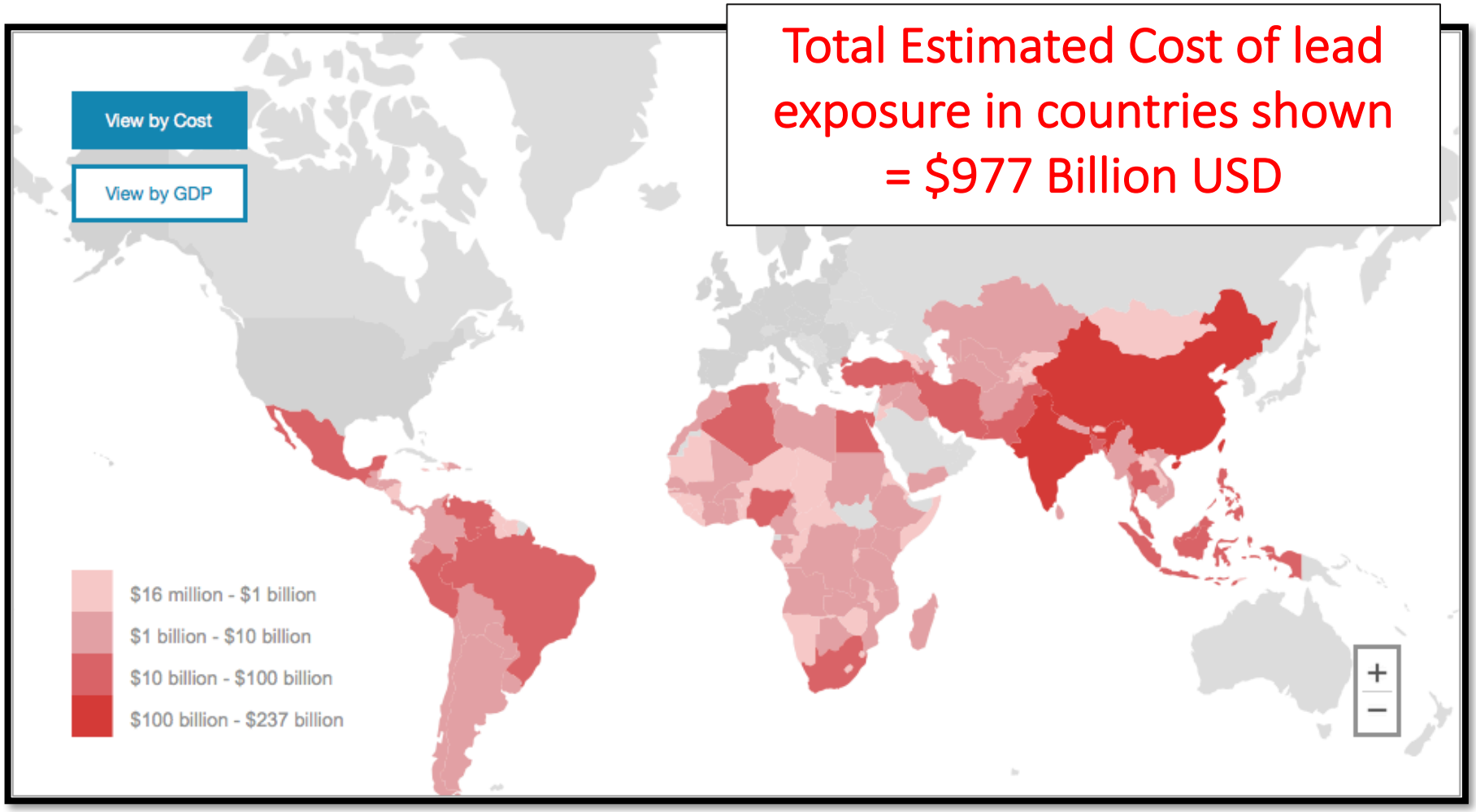
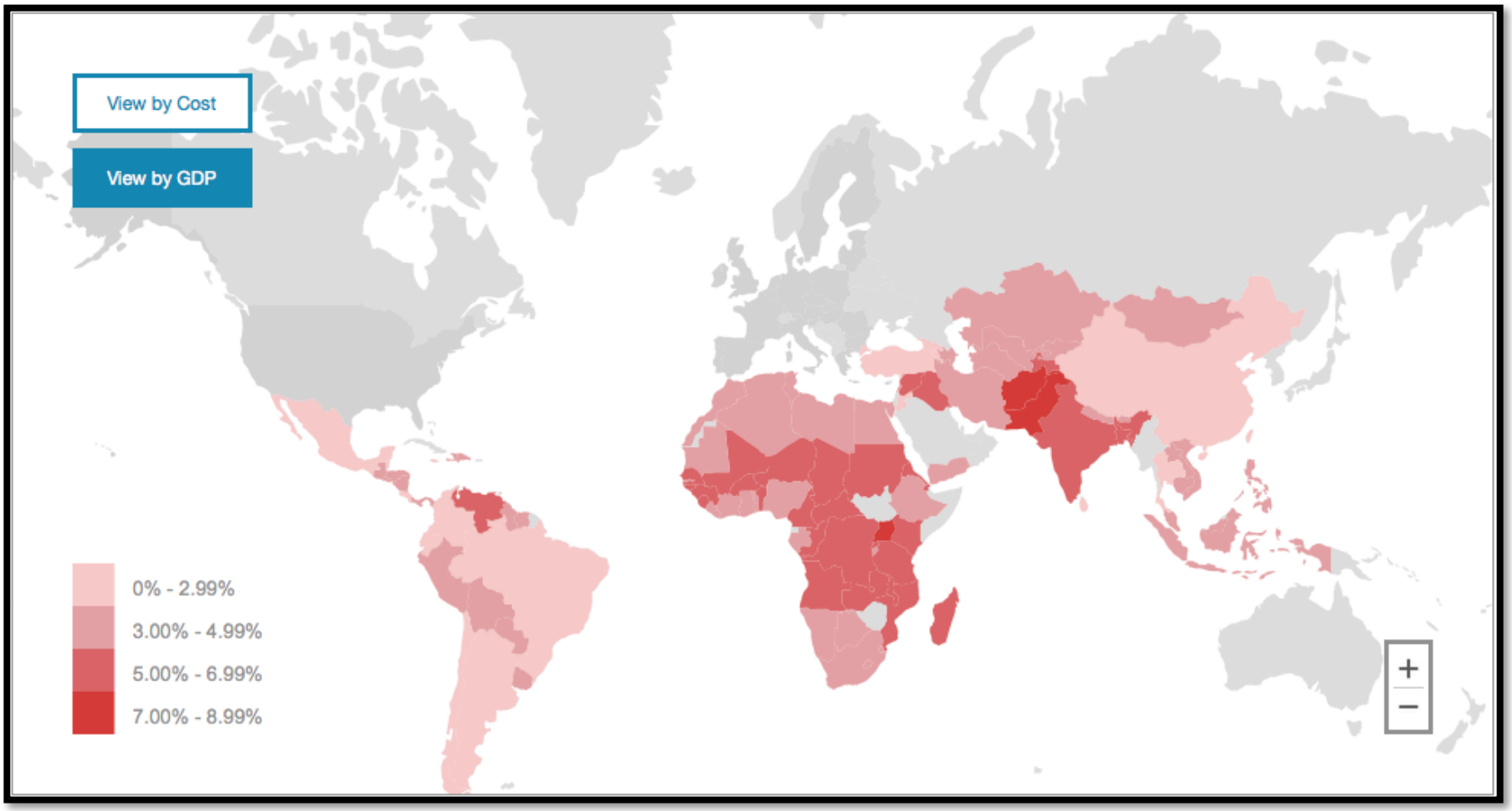
Costs of Childhood Lead Exposure



http://www.med.nyu.edu/pediatrics/research/environmentalpediatrics/leadexposure

Costs of Childhood Lead Exposure, % of GDP



Country specific example: Cameroon

Cameroon

Region: Africa

Sub-Region: Middle Africa

Cost Compared to the region:

15 Millions — 300 Billions

Percent GDP Loss Compared to the region:

0% — 10%

Cost:

$2.52 billion

Cost as percent of GDP:

5.28%

Average Blood Lead Level:

6.45 µg/dl

Presumed IQ Loss:

2 million points

Lost Lifetime Economic Productivity per IQ Point:

$1,247

Population under 5 years of age:

611,000 children

Comparison with Net Overseas Development Assistance in Africa

Country	Net ODA for 2008 (US $, millions)	Lost economic productivity per each 1-year cohort of children under 5yrs (US $, millions)
Cameroon	$299	$1,260
Côte d'Ivoire	$200	$881
Ethiopia	$1,845	$1,790
Ghana	$726	$860
Kenya	$955	$1,504
Mozambique	$1,345	$812
Nigeria	$638	$4,866
Rwanda	$452	$316
South Africa	$882	$8,854
Tanzania	$1,373	$1,241
Uganda	$1,009	$1,062
Zambia	$705	$721

Sources: Attina & Trasande, 2013; OECD iLibrary; ODA Official development assistance disbursements

Summary

- There is no safe level of lead – children are especially at risk
- The economic impact of lead exposure is enormous
- The Lead Paint Alliance Regulatory Toolkit provides helpful information to establish laws to eliminate lead in paint

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Thank you

Patrick Huber
U.S. Environmental Protection Agency
Huber.Patrick@epa.gov

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