The Price of Pollution: Costs of Environmental Health Conditions in Children

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What we'll talk about

- Why consider environmental health costs
- Report background and methods
- Summary results from each state report
- Methods for:
  - Cancer (California)
  - Asthma (New Hampshire)
  - Lead (Minnesota)
- Discussion and Q&A

Why Measure Environmental Health Costs?

- Growing concern about the environment and health
- Costs can inform policy decisions, priority setting, and resources allocation
- Economic benefits of health should be considered when assessing costs of pollution prevention

Impact from Past Studies

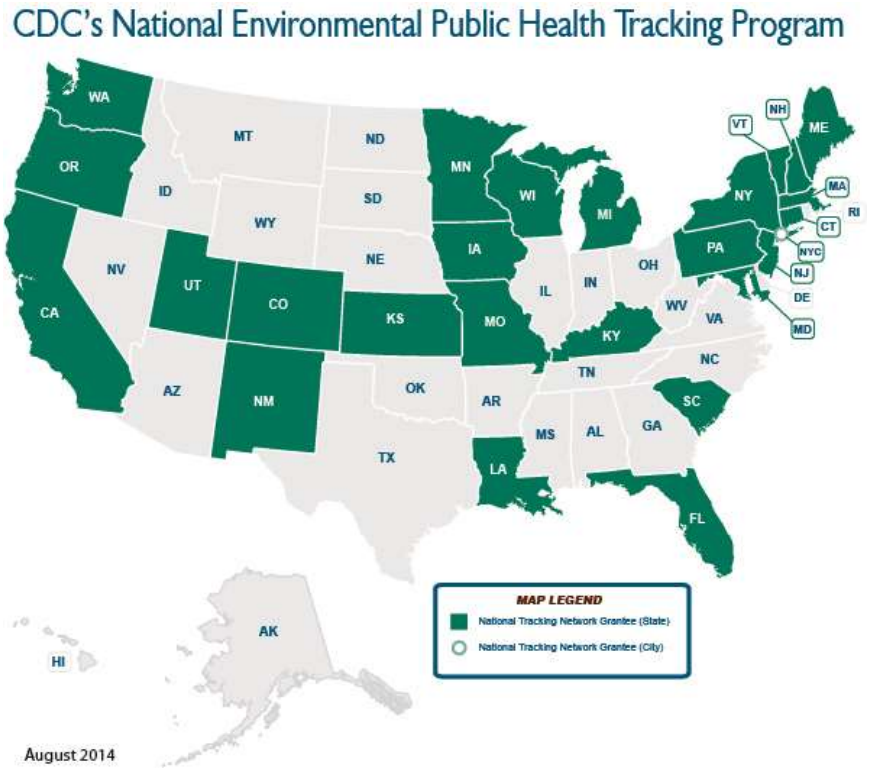
- In NYS, estimated costs due to 4 occupational illnesses totaled $600 million per year in NYS
  - Persuaded NYS Legislature to fund medical care to employees injured/ill at work

- In the U.S., estimated costs of 4 diseases in children caused by harmful exposures totaled $54.9 billion
  - Led to U.S. government funding the National Children's Study

Report Background

- Collaborative effort between grantees of the CDC National Environmental Health Tracking Program

  - California*
  - Connecticut
  - Florida
  - Minnesota*
  - New Hampshire*
  - Oregon
  - Utah



* Published state cost reports

General Methods

- Based on methods from:
  - Landrigan et al. (2002)
  - Trasande and Liu (2011)
  - CDC's Chronic Disease Cost Calculator (2013)

- Selected conditions (vary by state):
  - Asthma
  - Cancer
  - Lead exposures
  - Neurobehavioral disorders
  - Mercury poisoning

Summary Calculation

Costs due to the Environment =

Size of population at risk * Rate of disease * Cost per case * Environmentally attributable fraction (EAF)

Types of Costs Included

- **Direct costs**
  - Medical and non-medical

- **Indirect costs**
  - Lost earnings to care for child due to the condition

- **Lost potential earnings**
  - Due to premature death, reduction in IQ, or disability

Both ***Annual*** and ***Lifetime*** costs were included when feasible

Environmentally attributable fraction (EAF)

- The percentage of the disease burden that would be eliminated if environmental risk factors were reduced to their lowest feasible levels

Condition	EAF (range of values)
Asthma	30% (10-35%)
Cancer	5% (2-10%)
Lead exposures	100%
Neurobehavioral disorders	10% (5-20%)
Mercury poisoning	70%

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California specific EAF
30% (20-41%)
15% (9-21%)

Summary Findings in California

	Cost due to the environment	
	Annual costs	**Lifetime costs**
Asthma	$208 million	$6 million
Cancer (lymphomas, leukemia, brain/CNS)	$19 million	$33 million
Neurobehavioral disorders (intellectual disability, attention deficit and hyperactivity disorder, autism spectrum disorder)	$27 million	$2.3 billion
Lead exposures	N/A	$8-11 billion
Total costs due to the environment	**$254 million**	**$10-13 billion**

CANCER

Summary Calculation

Costs due to the Environment =

Size of population at risk * Rate of disease * Cost per case * Environmentally attributable fraction (EAF)

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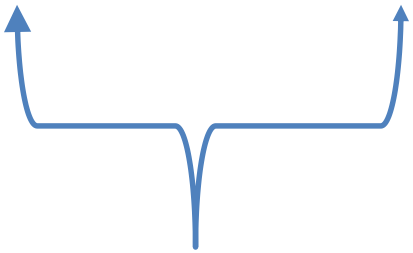
Size of population at risk * **Rate of disease** * Cost per case * Environmentally attributable fraction (EAF)



Number of cases

Annual Cancer Burden in California Children, ages 0-14

Children <u>diagnosed</u> with cancer in 2010:

All types: 1,240

Most common cancers:

803

(leukemia, lymphoma, and brain/CNS)

Child <u>deaths</u> from cancer in 2010:

All types: 194

Most common cancers:

135

(leukemia, lymphoma, and brain/CNS)

Summary Calculation

Costs due to the Environment =

Size of population at risk * Rate of disease * **Cost per case** * Environmentally attributable fraction (EAF)

Costs of Childhood Cancers in California

➢ Annual Costs

- Direct medical costs: prescription medications, physician visits, ED visits, hospitalizations.
- Indirect: Lost parental wages due to caring for child being hospitalized/treated for cancer.

➢ Lifetime Costs

- Lost future potential earnings due to:
  - premature mortality
  - reductions in IQ from radiation treatment for brain/CNS cancers only.

Costs of Childhood Cancers in California

- **Annual Costs Total: $125 million**
  - Direct medical: $122.5 million
  - Indirect: $2.7 million

- **Lifetime Costs Total: $222 million**
  - Lost future potential earnings due to:
    - premature mortality: $200 million
    - reductions in IQ: $19.9 million

Appendix A:
http://www.phi.org/uploads/files/Appendix_A_2015%20CEHTP%20Costs%20of%20Environmental%20Health%20Conditions%20in%20California%20Children%20FAQ.pdf

Summary Calculation

Costs due to the Environment =

Size of population at risk * Rate of disease * Cost per case * **Environmentally attributable fraction (EAF)**

EAF for Childhood Cancer in California

Included both outdoor and indoor hazards:

- Associated with leukemia, lymphoma, and/or brain/CNS cancer
- Had California-specific hazard data available

Hazard included in California EAF calculation	Timing of exposure
Indoor Radon	Childhood
Secondhand smoke (SHS)	In-utero
Solvents	In-utero and/or childhood
Parental occupational pesticides	Periconception
Residential pesticides	In-utero and/or childhood
Traffic pollution	In-utero
Parental occupational traffic pollution	Periconception

Appendix B: http://www.phi.org/uploads/files/Appendix%20_B_2015%20CEHTP%20Costs%20of%20Environmental%20Health%20Conditions%20in%20California%20Children.pdf

EAF for Childhood Cancer in California

Approach :

- Calculate individual EAFs for each hazard – cancer combination
- Calculate an EAF for each cancer type
- Combine EAFs for all three cancer types

EAF for childhood cancer in California = 15% (9-21%)

Appendix B:
http://www.phi.org/uploads/files/Appendix%20_B_2015%20CEHTP%20Costs%20of%20Environmental%20Health%20Conditions%20in%20California%20Children.pdf

Preventing childhood cancer and annual costs in California

EAF	Annual number of new cancer cases	Cancer cases due to the environment each year	Annual cost for cancer (2013$)	Annual cost of environmentally attributable cancer (2013$)
9%	803	72	$125 million	$11
15%		**120**		**$19 million**
21%		169		$26

By reducing environmental hazards, each year we could

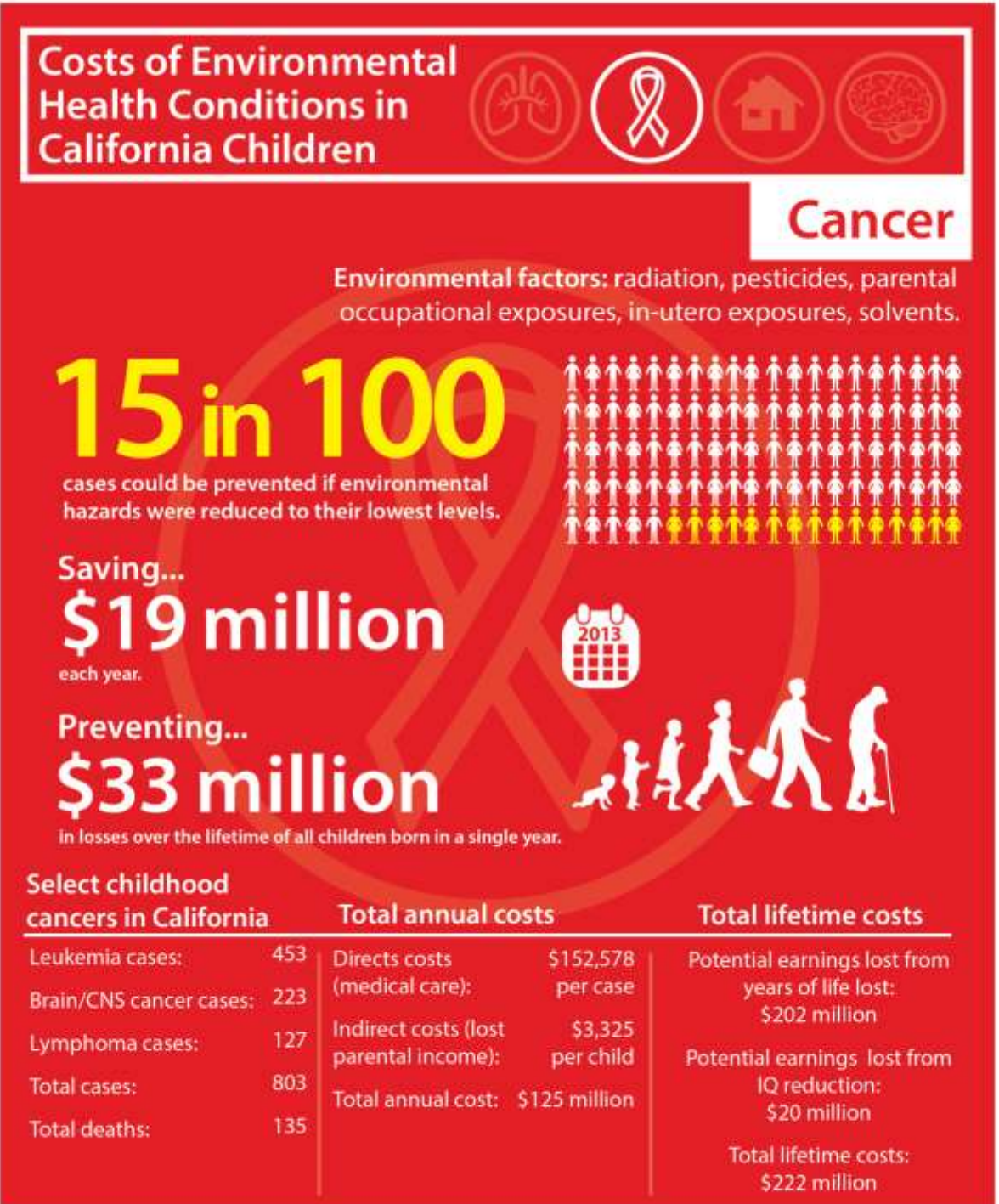
- Prevent cancer in 120 children
- Save $19 million in medical costs and wages

Preventing childhood cancer deaths and lifetime costs in California

EAF	Annual number of deaths	Cancer deaths due to the environment	Lifetime cost for cancer (2013$)	Lifetime cost of environmentally attributable cancer (2013$)
9%	135	12	$222 million	$20
15%		**20**		**$33 million**
21%		28		$47

By reducing environmental hazards, we could

- Prevent 20 cancer deaths among children each year, and
- Prevent the loss of $33 million in lifetime earnings for



Full report, appendices, FAQs, all infographics:
www.phi.org/CEHTPKidsHealthCosts

Cancer infographic:
www.phi.org/uploads/images/FINALcondition-profiles-v13_Cancer.png

For more information:
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Thank you!

CEHTP staff:

- Paul English
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Tracking Implementation Advisory Group