



*Costs of Diseases and Disabilities: Due to
Environmental Contaminants:
Washington State Case Study*

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Economic Costs of Environmental Diseases and Disabilities

Studies now possible because of:

- Cost of illness' models developed by national governmental organizations
 - Direct healthcare costs
 - Indirect costs
- 'Environmentally attributable fractions'



Economic Costs of Environmental Diseases and Disabilities

Three types of studies:

- Costs of exposure to individual toxic chemicals (lead, mercury)
- Costs of air pollution
- Costs of multiple disease outcomes, especially in children



Purpose of Study:

This study was intended to estimate the health and related costs associated with continued use of toxic chemicals in Washington State,

but:

- We will never know the economic costs precisely
- The economic costs do not take account of the emotional and psychological costs



Diseases and Disabilities:

- Childhood and Adult Asthma
- Cardiovascular Disease
- Childhood and Adult Cancer
- Childhood Lead Exposure
- Birth Defects
- Neurobehavioral Disorders



Study Assumptions/Limitations:

- Only a limited number of diseases and disabilities considered
- Knowledge of environmentally attributable risk is emerging
- Use of national cost estimates
- Estimates adjusted to 2004 \$
- Use of national population data, when WA data not available



Costs of Childhood Asthma:

- Method
 - National cost of childhood asthma is \$6.6 billion
 - Environmentally attributable fraction is 30% (range 10-35%)
 - 8% of children in WA (0-17 y) have asthma
- Results
 - Cost of childhood asthma attributable to environmental contaminants in Washington State is \$48.9 million in 2004 \$
 - This comprises \$34.1 million (direct costs) and \$14.8 million (indirect costs)
 - Range = \$16.3 – \$57.1 million
 - This is about 11% of the total cost of asthma in Washington State



Costs of Adult and Child Asthma:

- Method
 - Cost of asthma in WA is \$406 million a year, comprising \$240 million (direct costs) and \$166.1 million (indirect)
 - Environmentally attributable fraction is 30% (range 10-35%)
- Results
 - Cost of adult and child asthma attributable to environmental contaminants in Washington State is \$127.8 million in 2004 \$
 - This comprises \$75.5 million (direct costs) and \$52.3 million (indirect costs)
 - Range = \$42.6 – \$149.2 million



Costs of Cardiovascular Disease (1):

Methods

- National costs:
 - \$351 billion, comprising \$209 billion (direct costs) and \$142 billion (indirect costs) in 2003 \$ (CDC)
 - \$368.4 billion, comprising \$226.7 (direct costs), \$33.6 billion (indirect morbidity costs), and \$108.1 billion (indirect premature mortality costs) in 2003 \$ (NHLBI)
- Environmentally attributable fraction = 7.5%, with an uncertainty range of 5-10%
- Costs in WA estimated at 2.09% of national costs, based on population



Costs of Cardiovascular Disease (2):

Results

- Based on CDC Cost Estimate:
 - Cost of cardiovascular disease attributable to environmental contaminants in Washington State is \$564.3 million in 2004 \$
 - Comprising \$335.8 million (direct costs) and \$228.5 million (indirect costs)
 - Range = \$376.2 – \$752.4 million
- Based on National Heart, Lung & Blood Institute Cost Estimate:
 - Cost of cardiovascular disease attributable to environmental contaminants in Washington State is \$592.8 million
 - Comprising \$364.8 million (direct costs) and \$54.1 million (indirect costs)
 - Range = \$395.2 - \$790.4 million



Costs of Childhood Cancer:

Method

- National costs = \$6.6 billion in 1997 \$
- Environmentally attributable fraction = 5% with an uncertainty range of 2 -10%
- About 308 children diagnosed with cancer every year in Washington State

Results

- Cost of childhood cancer attributable to environmental contaminants in WA is \$15.4 million in 2004 \$
- This comprises \$9.1 million (direct costs), \$2.0 million (indirect costs) and \$4.2 million (premature mortality)
- Range = \$6.2 - \$30.7 million



Costs of Adult and Child Cancer :

Methods

- National costs: \$189.4 billion, comprising \$69.4 (direct costs), \$16.9 billion (indirect morbidity costs), and \$103.5 billion (premature mortality) in 2003 \$
- Environmentally attributable fraction = 5%, with an uncertainty range of 2-10%
- Costs in Washington are 2.09% of national costs, based on population

Results

- Costs of adult and child cancer attributable to environmental contaminants is \$203.5 million in 2004 \$
- Comprising \$74.4 million (direct costs), \$18.1 million (indirect morbidity costs), and \$111 million (indirect premature mortality costs)
- Range = \$81.4 - \$407.2 million



Costs of Lead Exposure:

- Methods
 - National costs, based on national blood lead level, the relationship between blood lead level and IQ loss, and the relationship between IQ loss and lifetime earnings
 - WA mean blood level = national mean
 - Environmentally attributable fraction = 100%
 - Demographic data on the number of children in WA and their lifetime earnings potential
- Results
 - Total lost lifetime income = \$1,478.8 million in 2004 \$



Costs of Birth Defects (1):

Methods:

- Washington costs: \$158 million in 2001 \$
- National costs (CDC): \$8 billion, comprising \$2.1 billion (direct costs) and \$5.9 billion (indirect costs) in 1992 \$
- Washington has 2.03% of the live births in the US
- Environmentally attributable fraction = 2.5% with an uncertainty range of 2.5 – 5%



Costs of Birth Defects (2):

Results:

- Trust for America's Health
 - Cost of birth defects attributable to environmental contaminants is \$4.2 million in 2004 \$
 - Range = \$4.2 – \$8.4 million
- CDC
 - Cost of birth defects attributable to environmental contaminants is \$5.5 million in 2004 \$
 - Comprising \$1.5 million (direct costs) and \$4.0 million (indirect costs)
 - Range = \$5.5 - \$10.9 million



Costs of Neurobehavioral Disorders (1):

Methods:

- National costs
 - \$92 billion in 1997 \$ (Landrigan)
 - \$5,143 per child in 1999 \$ special ed. (Massey & Ackerman)
 - \$146.2 billion comprising \$127.2 billion (direct costs), \$7.7 billion (indirect morbidity costs), and \$11.3 billion (indirect premature mortality costs) in 2004 \$ (NHLBI)
- Environmentally attributable fraction = 10% with an uncertainty range of 5 - 20 %
- In 2004, 124,067 children received special education in WA



Costs of Neurobehavioral Disorders (2):

Results:

- Landrigan et al.
 - Cost of neurobehavioral disorders attributable to environmental contaminants in Washington State is \$226.4 million in 2004 \$
 - Range \$113.2 - \$452.7 million
- MA (Massey and Ackerman)
 - Cost of special education costs attributable to environmental contaminants in Washington State is \$72.4 million in 2004 \$
 - Range = \$36.2 – \$144.7 million
- National Heart, Lung & Blood Institute
 - Cost of neurobehavioral disorders attributable to environmental contaminants in Washington State is \$305.6 million in 2004 \$
 - Comprising \$265.9 million (direct costs) and \$16.2 million (indirect costs)
 - Range = \$152.8 - \$611.1 million



Conclusions (1):

The cost of childhood diseases and disabilities attributable to contaminants in WA is about \$1,770 million a year in 2004 \$

Comprising: at least \$44.4 million in direct costs
\$1,500 million in indirect costs

Range: \$1,600 - \$2,000 million



Conclusions (2):

The cost of adult and childhood diseases and disabilities attributable to contaminants in WA is about \$2,680 million a year in 2004 \$

Comprising: \$766 million in direct costs
 \$1,930 million in indirect costs

Range: \$2,037 - \$3,446 million



Conclusions (3):

- A significant proportion of the costs can be attributed to lead exposure
- These estimates are consistent with Landrigan et al. (2002), Massey and Ackerman (2003), and other studies



Conclusions in Context:

- Direct costs are at least 0.3% (childhood) and 4.7% (adult and child) of total WA healthcare costs
- Total (direct and indirect) costs are 0.7% (childhood) and 1% (adult and child) of WA Gross State Product



Final Words....(1)

- The economic costs of diseases and disabilities attributable to environmental contaminants are very significant, but they have not generally been considered in environmental health policy and decision-making processes
- To date, these processes have included the costs of environmental protection measures and have therefore not been comprehensive
- Health and related costs are born by society, unlike the costs of environmental protection measures



Final Words....(2)

- These costs are largely preventable, by eliminating and exposures to environmental exposures
- Eliminating and reducing exposures to toxic chemicals makes good economic sense, as well as good sense from a public health perspective
- Policies and programs like the WA rule on persistent bioaccumulative toxins and the mercury chemical action plan can lead to improvements in health and to economic benefits



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Study available at: <http://washington.chenw.org>

Articles:

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http://www.nwpublichealth.org/docs/nph/f2005/web_ex_davies_f2005.pdf
2. “The Economic Costs of Environmental Diseases and Disabilities” Rachel’s Democracy & Health News Jan 5 2006
http://www.rachel.org/bulletin/pdf/Rachels_Environment_Health_News_2529.pdf
3. “Economic Costs of Childhood Diseases and Disabilities Attributable to Environmental Contaminants in Washington State, USA” EcoHealth, June 2006 (in press) <http://www.ecohealth.net/>