



National Institute of Environmental Health Sciences
Your Environment. Your Health.

*Environmental Health in Israel 2017:
Progress and Challenges*

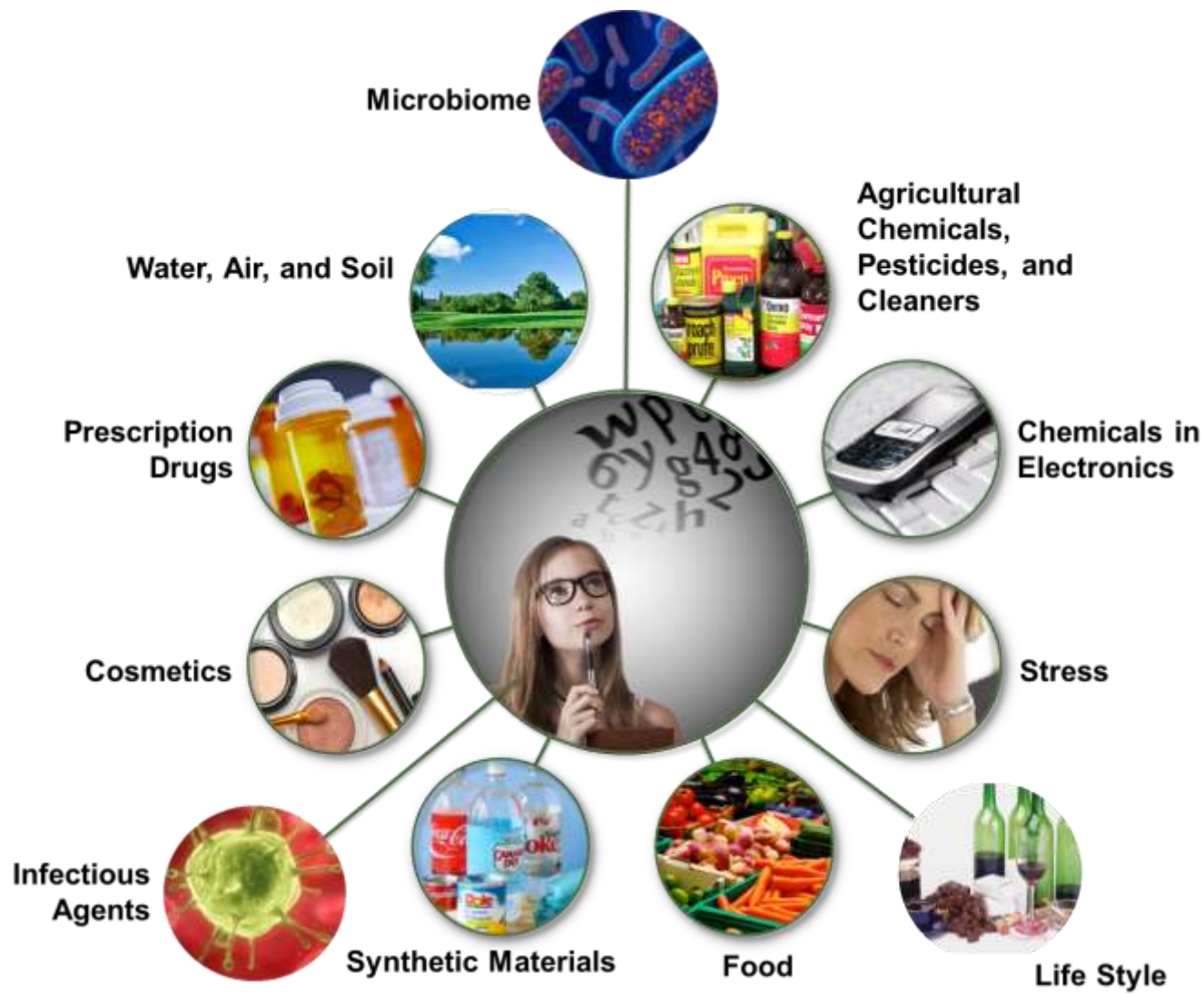
**Measuring Economic Impacts at
NIEHS: Resources for Researchers**

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Director*

*National Institute of Environmental Health Sciences
National Toxicology Program*

18 December 2017

What is our environment?

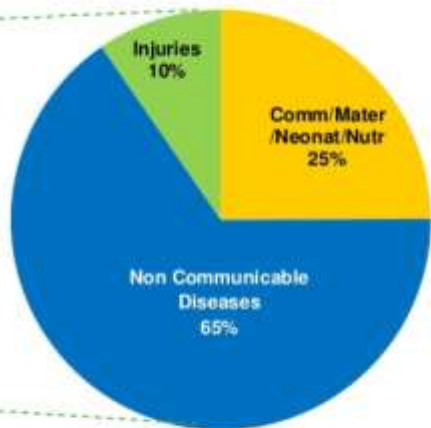
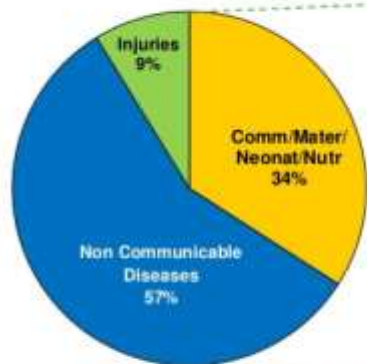


Shifts in Causes of Death and Burden of Disease

Causes of Death

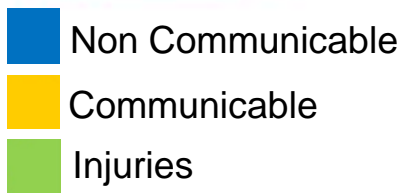
1990

2010

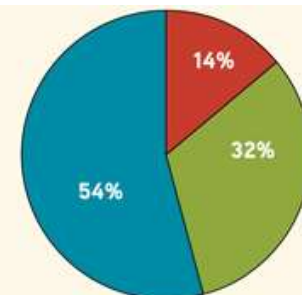
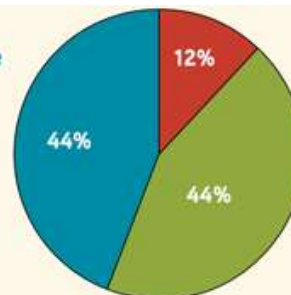


46.5 million

52.7 million



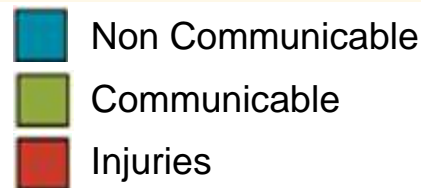
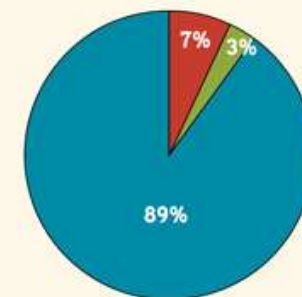
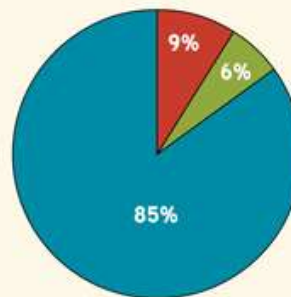
Low- and Middle-Income Countries



2002

2030

High-Income Countries



Lopez et al. Global Burden of Disease and Risk Factors. The World Bank Group

National Institutes of Health
U.S. Department of Health and Human Services

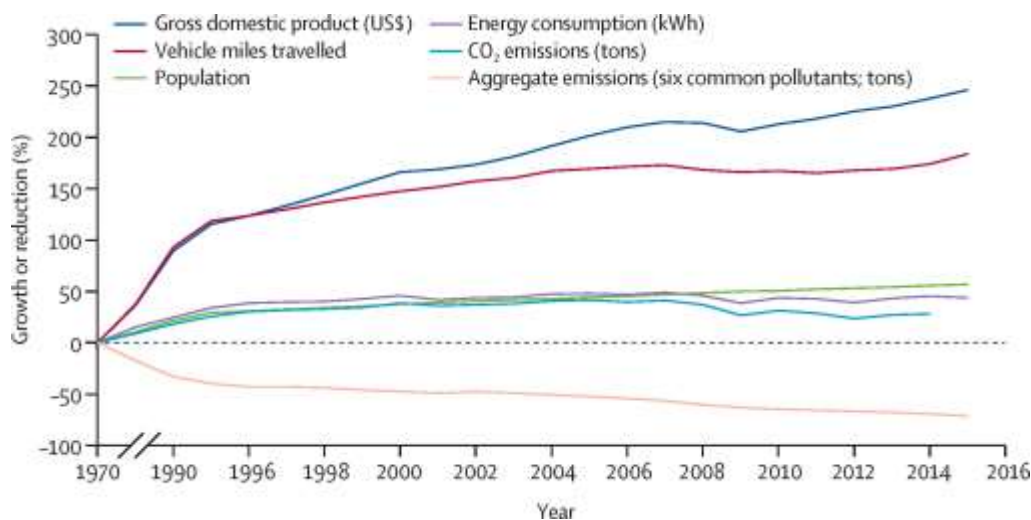
Lancet Commission on Pollution and Health Report

- Pollution related disease is responsible for 9 million deaths worldwide (16%)
- 92% of pollution-related deaths occur in low-income and middle-income countries
- Chemical pollution effects on human health are poorly defined and almost certainly underestimated
- **Good News:** much pollution can be eliminated, and pollution prevention can be highly cost-effective



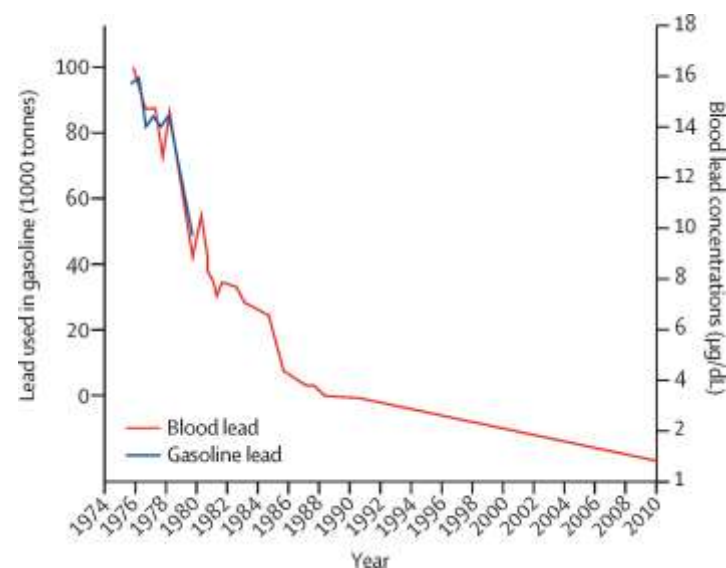
Pollution Prevention is Cost Effective

Air Emissions



- Since 1970: 70% reduction in air emissions, 250% increase in GDP
- Every \$1 invested in ambient air pollution control yields \$30 in economic benefit (EPA 2011)

Lead



- Since 1980: Over \$6T aggregate economic benefit from IQ gains from Lead removal from gasoline (Grosse et al. EHP 2002)

Environmental Health Economics

COST EFFECTIVENESS:

Compare relative costs and non-monetized effects

COST :

Resources required, direct and indirect

BENEFIT :

Outcomes resulting from an action or program

MONETIZATION :

Identifying present day value of both costs and benefits

- Large body of work on both environmental economics and health economics
- Relatively little specifically focused on environmental health economics

Strategic Plan Goal 10

Evaluate the economic impact of environmental health policies, practices, and behaviors...to improve public health and minimizes economic burden by:

- Developing tools and databases for researchers
- Supporting/conducting research related to environmental health economic analyses





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Tools and Databases



Resources for Researchers

Research

Resources for Scientists

Environmental Health
Economic Analysis

Annotated Bibliography

Methodology

Supplemental Resources

All Scientists

All Research Groups

Annotated Bibliography

The Environmental Health Economic Analysis (EHEA) Annotated Bibliography is a searchable database that summarizes key attributes from over 70 curated environmental health science articles that include economic analyses. NIEHS developed the bibliography as a resource for environmental health researchers who are looking to incorporate economic analyses into their research, in support of [Goal 10](#) of the NIEHS Strategic Plan.

The EHEA Annotated Bibliography provides detailed references, with links to full text when possible. Researchers can search the database and sort results by exposures studied, health outcomes analyzed, economic analysis methods used, and economic data cited. We also provide info on our [methods](#) and [supplemental resources](#).

Search the EHEA Annotated Bibliography

Type keywords below

Submit

www.niehs.nih.gov/ehea

Annotated Bibliography Components

- Provides structured annotations for each article
- Intended to help researchers learn EHEA techniques, and leverage ongoing work in this emerging area.
- To date, 70 articles have been annotated. Contact EHEA@niehs.nih.gov to nominate additional articles for review.

The screenshot shows the search results for 'air pollution' on the Environmental Health Economic Analysis Annotated Bibliography website. The page includes a search bar with the term 'air pollution' and a 'Search' button. Below the search bar, there are filters for Article Type, Environmental Agents, and Health Outcomes. The search results are displayed in a list format, showing the title, authors, journal, year, and economic evaluation for each article.

| Article Type | Results |
|------------------|---------|
| Research article | 18 |
| Review | 4 |

| Environmental Agents | Results |
|--------------------------|---------|
| Air pollutants | 13 |
| Environmental pollutants | 1 |
| Ionizing radiation | 1 |
| Metals | 1 |
| UV | 1 |

| Health Outcomes | Results |
|---|---------|
| Birth outcomes | 2 |
| Cancer | 3 |
| Cardiovascular outcomes | 3 |
| Mortality | 9 |
| Neurological/Cognitive outcomes | 3 |
| Other (gastrointestinal outcomes, musculoskeletal outcomes) | 1 |
| Respiratory outcomes | 11 |

Search Results
Environmental Health Economic Analysis Annotated Bibliography

This interactive bibliography provides useful recommendations, methods, and guidelines for individuals interested in performing or learning more about integrating environmental health and economics research. The tool summarizes over 70 articles, books, websites and other tools where economic analyses have been applied to environmental health sciences research.

21 results for air pollution [Return to main search](#)

Use checkboxes to select articles to generate a Printable PDF [Generate PDF](#)

- 1: [Air pollution, health and economic benefits - lessons from 20 years of analysis](#)
 Authors: Hall J.V, Brajer V, and Lurmann F.W
 Journal: Ecological Economics
 Year: 2010
 Economic Evaluation: Cost-benefit analysis (CBA)
- 2: [Local air pollution and global climate change: a combined cost-benefit analysis](#)
 Authors: Bollen J, Van Der Zwaan B, Brink C, and Eerens H
 Journal: Resource and Energy Economics
 Year: 2008
 Economic Evaluation: Cost-benefit analysis (CBA)
- 3: [Particulate air pollution in urban areas of Shanghai, China: health-based economic assessment](#)
 Authors: Kari HD and Chen BH
 Journal: Science of the Total Environment
 Year: 2004

Annotations include:

- Type of article
- Type of economic evaluation
- Population
- Exposure
- Health outcomes
- Geographic location
- Costs and benefits measured
- Source of data
- NIEHS funding

Prenatal exposure to airborne polycyclic aromatic hydrocarbons and IQ: Estimated benefit of pollution reduction

Environmental Health Economic Analysis Annotated Bibliography

[Go Back](#)

Details Research article | Cost-benefit analysis (CBA)

Authors Perera F, Weiland K, Neidell M, and Wang S

Journal Journal of Public Health Policy

Summary This study examined the benefits of a modest decrease in PAH exposure to children in New York City, and estimated a \$215 million gain in lifetime earnings due to IQ increase for a single year. These results suggested that a modest reduction in ambient concentrations of PAH is associated with substantial economic benefits as measured by lifetime earnings for exposed children.

Population Children (0-5 years) — Columbia Center for Children's Environmental Health NYC cohort (low-income, Medicaid recipients)

Health Outcomes

- Neurological/cognitive outcomes (IQ deficits)

Environmental Agents

List of Environmental Agents:

- Air pollutants (Polycyclic aromatic hydrocarbons (PAHs))

Source of Environmental Agents:

- Combustion of fossil fuels and other organic materials

Economic Analysis Data Resources

Data Sources

- [EPA Environmental Benefits Mapping and Analysis Program \(BenMAP-CE\)](#) ↗
- [National Cancer Institute – Surveillance, Epidemiology, and End Results Program](#) ↗
- [Behavioral Risk Factor Surveillance System](#) ↗
- [National Health and Nutrition Examination Survey](#) ↗
- [Medical Expenditure Panel Survey](#) ↗
- [Medicaid Statistical Information System \(MSIS\) State Summary Datamarts](#) ↗
- [Medicare HOS Research Data Files](#) ↗
- [Kaiser Permanente: Research Program on Genes, Environment and Health](#) ↗
- [DATA.GOV](#) ↗
- [Pew Research Center: Data](#) ↗
- [Kaiser Family Foundation](#) ↗
- [The California Endowment](#) ↗
- [Global Burden of Disease \(GBD\)](#) ↗



Leonardo Trasande, M.D., describes a new method for estimating the economic impact of the chemical bisphenol-A during a lecture at NIEHS. (Photo courtesy of Steve McCaw)

Resources for Researchers



[Annotated Bibliography
www.niehs.nih.gov/ehea](http://www.niehs.nih.gov/ehea)



[Partnerships for Environmental
Health Evaluation Metrics Manual:
www.niehs.nih.gov/peph](http://www.niehs.nih.gov/peph)



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Examples of NIEHS Funded EHEA Research



A 10 ppb decrease in average ozone levels increases worker productivity by 5.5%.

Journals

American Economic Review

About the AER

Forthcoming Articles

Issues

The Impact of Pollution on Worker Productivity

Imma Gestfivis
Matthew Neidell

AMERICAN ECONOMIC REVIEW
VOL. 102, NO. 7, DECEMBER 2012
pp. 3659-700

Journal of Public Health Policy

August 2014, Volume 35, Issue 3, pp 327-336

Prenatal exposure to airborne polycyclic aromatic hydrocarbons and IQ: Estimated benefit of pollution reduction

Authors

[Authors and affiliations](#)

Frederica Perera , Katherine Weiland, Matthew Neidell, Shuang Wang

For a one year cohort of Medicaid births in New York City, modest reductions in air pollution could result in an estimated \$43 million gain in lifetime earnings due to IQ increase.



Volume 100, Issue 4
1 April 2015

Estimating Burden and Disease Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union

Leonardo Trasande , R. Thomas Zoeller, Ulla Hass, Andreas Kortenkamp, Philippe Grandjean, John Peterson Myers, Joseph DiGangi, Martine Bellanger, Russ Hauser, Juliette Legler ... [Show more](#)

The Journal of Clinical Endocrinology & Metabolism, Volume 100, Issue 4, 1 April 2015, Pages 1245-1255, <https://doi.org/10.1210/jc.2014-4324>

Published: 01 April 2015 [Article history](#) ▾

EDC exposure likely costs the European Union €157 billion (\$209 billion) a year in actual health care expenses and lost earning potential

[Article Contents](#)



Particulate Matter Exposure and Preterm Birth: Estimates of U.S. Attributable Burden and Economic Costs

Leonardo Trasande,^{1,2,3,4,5} Patrick Malecha,¹ and Teresa M. Attina¹

¹Department of Pediatrics, ²Department of Environmental Medicine, and ³Department of Environmental Health Sciences, New York University School of Medicine, New York, New York, USA; ⁴NYU Wagner School of Public Service, New York, New York, USA; ⁵NYU Global Public Health, New York, New York, USA

In 2010, preterm birth costs attributable to PM_{2.5} exposure were estimated at >\$5 billion. Considerable health and economic benefits could be achieved through environmental regulatory interventions that reduce PM_{2.5} exposure in pregnancy



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Air Pollution and Mortality in the Medicare Population

Qian Di, M.S., Yan Wang, M.S., Antonella Zanobetti, Ph.D., Yun Wang, Ph.D., Petros Koutrakis, Ph.D., Christine Choirat, Ph.D., Francesca Dominici, Ph.D., and Joel D. Schwartz, Ph.D.

N Engl J Med 2017; 376:2513-2522 | June 29, 2017 | DOI: 10.1056/NEJMoa1702747

In the entire Medicare population, there was significant evidence of adverse effects related to exposure to PM_{2.5} and ozone at concentrations below current national standards. This effect was most pronounced among self-identified racial minorities and people with low income.

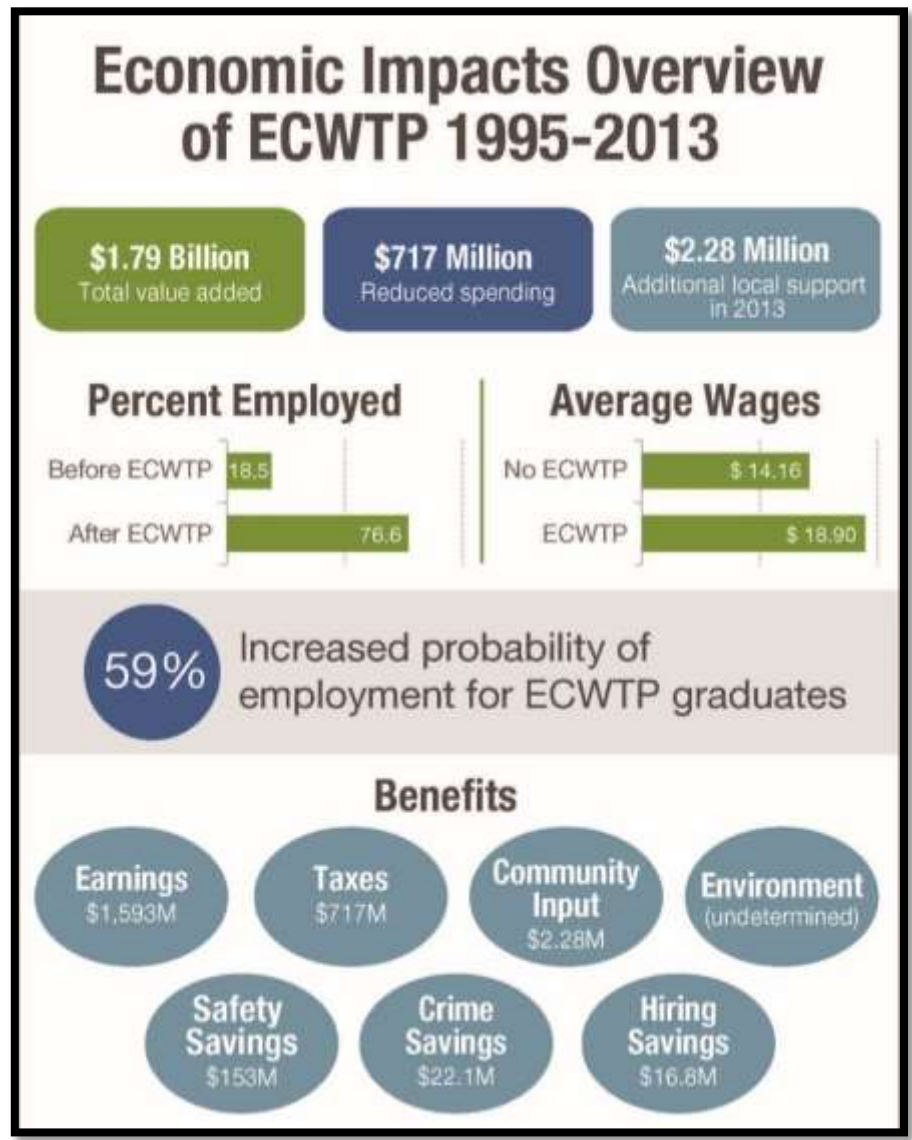
Environmental Career Worker Training Program

- Train unemployed or underemployed individuals by delivering holistic and comprehensive training to disadvantaged and underserved communities;
- Address risk of occupational health disparities;
- Provides job readiness, remediation, and life skill training;
- Prepare and place participants in environmental restoration, construction, and hazardous materials/waste industries; and
- Evaluate the effectiveness of the training program and it's impact.



Environmental Career Worker Training Program: Economic Impacts

- Many benefits found, e.g.
 - Reduced gov't expenditures
 - Higher earnings
 - Fewer workplace injuries
 - Lower hiring costs
 - Reduced crime related costs
 - Environmental benefits
 - In-kind donations



Take Home Messages:

Environmental Health Economics Assessment is a vitally important area of emphasis for NIEHS.

We've worked to create tools and datasets that will hopefully assist researchers to move further in this direction by monetizing outcomes.

Critically important component in continuing argument for funding preventative approaches



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THANK YOU!

<http://www.niehs.nih.gov>

***You can't change your genes,
but you can change your environment.***

