

# Conclusions of Cost Benefit Analyses of Lead Abatement

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Studies have shown that lead abatement – phasing out leaded products and reducing lead hazards from historical products and contamination - have resulted in a reduction in health care costs, IQ loss and crime levels, all of which yields significant economic benefits.

## **Health Care Cost Reduction**

The annual cost of diseases in American children arising from lead poisoning is approximately \$43.4 billion per year [Landrigan et al, 2002]. This suggests reducing lead exposure will significantly reduce health care costs.

### Leaded Gasoline

Leaded gasoline (leaded petrol) is responsible for approximately 90 per cent of human lead exposures [Tsai & Hatfield, 2011] and is linked to a variety of serious health effects, particularly in children.

The United States Environmental Protection Agency (EPA) had measures taken to reduce the lead concentration in gasoline by 90%, down to 0.10gplg (grams per leaded gallon) by 1<sup>st</sup> January, 1986. The EPA estimated the cost of this to range from US \$608 million in 1986 to US \$441 million in 1992. The fall in costs was due to the projected declines in the demand for leaded gasoline [Schwartz, 1985].

Based on a Second National Health and Nutrition Survey (NHANES II), the EPA believed a reduction to 0.10gplg in gasoline would roughly halve the number of children with blood lead levels above those recognised as harmful at the time. In the eighties, the US Centers for Disease Control (CDC) recommended children's blood lead levels above 25µg/dL (micrograms per decilitre) should receive follow-up testing and possible treatment. It was estimated that implementing the rule in 1986 would prevent 172,000 children from exceeding 25µg/dl blood lead level. With the cost of treatment estimated for a child with blood levels above 25µg/dl to be roughly \$900, significant monetized benefits are incurred. Compensatory education may also be required for a subset of the children who may suffer cognitive effects from lead poisoning. This, on average, costs \$2600 per child assuming three years of part time compensatory education [Schwartz, 1985].

Phasing out leaded gasoline is also beneficial for adults as lead poisoning is linked with increased blood pressure, hypertension and higher risk of cardiovascular disease. The US EPA predicted reducing leaded gasoline to 0.10gplg would reduce the number of hypertensives who are male aged 40-59 by about 1.8 million in 1986. Valuing hypertensives through estimated costs of medical care, medication and lost wages, there was a benefit of \$220 per year for each hypertensive avoided. Lower blood pressure also reduces the possibility of heart attacks and strokes which incurred a benefit of \$60,000 per heart attack and \$44,000 per stroke avoided [Schwartz, 1985]

Further reductions in the number of countries using leaded gasoline have been made through the UNEP-led campaign which has resulted in a near global elimination of leaded fuel. This has led to over 1.2 million premature deaths avoided per year (of which 125,000 are children) and air lead levels dropping dramatically, 90 per cent or more, particularly in cities [PCFV, 2011].

## **Avoiding IQ Loss**

Elevated blood lead levels are associated with a decrease in intelligence quotient (IQ) levels and thus it is a cost to the community for health and remedial education and lost earning potential [Calvert, 1999].

A decrement of five IQ points results in an estimated income loss of \$275 to \$326 billion annually in the U.S [Tsai & Hatfield, 2011]. Lower incomes consequently leads to lower tax revenue with New York estimated to be losing nearly \$78 million dollars in tax each year due to the lowered earnings [Korfmacher, 2003]. In the U.S, phasing out leaded gasoline between 1976 and 1995 was associated with more than 90% of reduction in mean blood lead concentration [WHO, 2010, p.36]. Preventing these IQ decrements has yielded annual benefits of US \$110-319 billion in 2000 [Tsai & Hatfield, 2011] and has avoided a global loss of 320 million IQ points per year in children [PCFV, 2012].

## **Decreasing Crime Rates**

Studies have suggested a correlation between blood lead levels and crime rates, as those convicted of delinquency have a significantly higher bone lead level than those who have no juvenile convictions. Sales of leaded gasoline from 1941 to 1986 also correlate roughly with 90% of the fluctuation in crime rates from 1960 to 1998 [Wakefield, 2002]. Through a study from California State University, it has been revealed a near global elimination of leaded gasoline has led to lower crime rates with up to 58 million less incarcerations [PCFV, 2011].

## **Economic Benefits**

Reducing and phasing out leaded gasoline has a significant global benefit estimate of US \$2.4 trillion/year (4% of global GDP) [PCFV, 2011]. With phasing out leaded gasoline costing approximately US\$0.01-0.02 per litre, The World Bank believes countries can save five to ten times the conversion cost in health and economic savings [WHO, 2004]. For example, the United States has saved \$10 for every \$1 invested due to its phase out efforts [ELCI, 2003]. The U.S. aggregated benefit from the phase-out of leaded fuel is over \$500 billion per year and typically ranges from 2.98% to 3.54% of GDP [Tsai & Hatfield, 2011].

Based on Elise Gould [2009] estimates, for every dollar spent on controlling lead hazards (e.g. lead in paint on buildings and infrastructure, dust in building interiors and cavities, soil, sediments and drinking water) \$17-221 would be returned through health benefits, reduced spending on special education, increased IQ, higher life time earnings, tax revenue and reduced criminal activity.

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