

ENVIRONMENTAL ECONOMICS IN ACTION 2.1 An Example of an Externality: Air Pollution in Ecuador

Failing to put the correct 'price' on the environment can cause too much environmental degradation. Factory owners who decide to increase output face no cost for any resultant increase in pollution. This suggests that since the owners have no economic incentive to reduce emissions, the rest of society has too much pollution. Another example is the air pollution arising from driving to work. When most people drive to work, they typically do not pay for all of the pollution coming from their cars.

Jurado and Southgate (1999) explored these factory and automobile air quality externalities in Ecuador. Quito is the capital of Ecuador, and it lies high up in an Andean mountain valley. The high elevation exacerbates the air quality problem. The table below shows that the major sources of pollutants are vehicles and factories. At the time of the study, neither factory nor vehicle owners faced any immediate economic price for the pollution for which they were responsible.

Total suspended particulates (TSP)		Sulphur dioxide (SO ₂)	Nitrous oxides (NO _x)
Vehicles	1,069	659	5,298
Factories	7,170	18,707	5,023

These levels of air pollution exceed the maximum recommended levels set by the World Health Organization (WHO). In 1991, the concentrations of Total Suspended Particles (TSP) averaged 149.9 g/m³, compared with the WHO standard of 60 g/m³. Today, Quito still has air pollution challenges due to transportation emissions and industrialization that is occurring in the valley-mountain topology.

Jurado and Southgate estimated the economic costs of air pollution as measured by the impact on human health. Pneumonia and other respiratory ailments are the leading cause of death in all age groups in the city, and the high TSP levels exacerbate these risks. The study used statistical relationships between TSP levels and three standard measures of ill-health: restricted activity days, work days lost, and excess mortality.

The predicted increases in ill-health from pollution were valued in economic terms using several approaches, including the value of working time, and the cost of illness (e.g. hospital resources used up in treating patients; see rows 2 and 3 of the table below). Extra deaths were valued as the discounted value of lifetime earnings, which is a dated approach. This yielded a value of \$16,887 per avoided death in 1999 dollars, which inflates to \$25,650 dollars in 2018, which then gives the values in row 4 of the table.

	Annual costs to citizens of Quito (US\$1999)
Restricted activity day costs (given 3,433,000 restricted days)	\$14,418,600
Working days lost costs (given 1,765,000 working days lost)	\$12,708,000
Excess mortality costs: as per study (1999) for 94 extra deaths per year due to poor air quality	\$1,587,378
Excess mortality costs, revised in US\$2018: (\$193,000 per life in 2016 dollars, updated from Fankhauser et al., 1998)	\$18,142,000

We have used 'value of statistical life' estimates based on how much people are willing to pay for risk reductions (for details, see Chapter 6). The value of the reduced risk is increased by an order of magnitude in row 4. These new estimates are based on the figure of \$193,000 per avoided death from Fankhauser et al. (1998) for developing countries. The message is clear: externalities due to private air pollution decisions impose social costs on the citizens of Quito. The market failed to provide the air quality needed to avoid these costly health impacts.