

Health

AN ECOSYSTEM APPROACH

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Taking Control of Air Pollution in Mexico City

A clean air drive targets health improvements and health care savings

Located in a pollutant-trapping valley, Mexico City — one of the world's largest cities — has had limited success in battling suffocating air pollution. A new understanding of the health impacts of this pollution — and of people's role in both the problem and the solution — could lead to better targeted, more effective air improvement programs.



Photo: Lee Schipper, EMBARQ/WRI

Human activity and geography conspire to produce a poisonous scenario in Mexico City.

Famous for its size, its history, and the warmth of its people, Mexico City is also infamous for its air pollution. In 1992, the United Nations described the city's air as the most polluted on the planet. Six years later, that air earned Mexico the reputation of "the most dangerous city in the world for children."

This is a reputation Mexico has been working hard to improve. But despite more than a decade of stringent pollution-control measures, a dull haze hangs over the city most days, obscuring the stunning snow-capped mountains that frame the city and endangering the health of its inhabitants.

Many factors have contributed to this situation: industrial growth, a population boom (from 3 million in 1950 to some 20 million today), and the proliferation of vehicles. More than 3.5 million vehicles — 30% of them more than 20 years old — now ply the city streets.

Geography conspires with human activity to produce a poisonous scenario. Located in the crater of an extinct volcano, Mexico City is about 2,240 metres above sea level. The lower atmospheric oxygen levels at this altitude cause incomplete fuel combustion in engines and higher emissions of carbon monoxide, hydrocarbons, and volatile organic compounds. Intense sunlight turns these noxious gases into higher than normal smog levels. In turn, the smog prevents the sun from heating the atmosphere enough to penetrate the inversion layer that blankets the city.

Solving this problem has been a priority of the Metropolitan Environmental Commission, which is integrated with local and federal authorities. Recent efforts to curb emissions have been relatively successful. In the 1990s, for instance, the government introduced air quality improvement programs — PIICA and PROAIRE — that include, among other measures, a rotating one-weekday ban on private car use. On days of high pollution, the ban extends to every second day and some manufacturing activities are curtailed. In addition, car owners must have their vehicles certified every six months. But if lead, carbon monoxide, and sulfur dioxide are now under control, pollution levels of other contaminants are still far above air quality standards.



Photo: R. Muñoz

Surveys revealed that the population mistrusted government information about the city's pollution problem.

A closer look at pollution

When PROAIRE concluded in 2000, environmental authorities undertook a longer, ambitious air quality improvement program: PROAIRE 2002–2010. To develop the program, however, accurate measures were needed to determine how improving air quality would improve health and reduce health expenditures. A number of questions also needed to be answered about the relationship between the city's inhabitants and air pollution: How do people perceive pollution? How does it affect them? What are they willing to do or pay for cleaner air? How can they be motivated to help solve it?

The Mexico City government set out to answer these questions, with support from Canada's International Development Research Centre (IDRC) and the Netherlands Trust Fund through the World Bank and the Pan American Health Organization.

If the first question was fairly simple — what is the economic value of benefits reaped from reducing air pollution? — answering it was not. "No one really knows, or understands, the relationship between environmental contaminants and the health of inhabitants," says biologist Roberto Muñoz Cruz, subdirector of information and analysis at Mexico City's atmospheric monitoring system, part of the Secretaría del Medio Ambiente (department of the environment). The Secretaría coordinated the project in collaboration with the Centro Nacional de Salud Ambiental (national centre for environmental health), the non-governmental organization GRECO (a study group on relations between the environment and behaviour), and the Instituto de la Mujer del Distrito Federal (Women's Institute of Mexico City).

The researchers focused on health hazards posed by the most serious pollutants in Mexico: ozone, produced when nitrogen oxides and volatile organic compounds react in sunlight, and PM₁₀ — respirable particulate matter less than 10 microns (0.01 millimetres) in diameter. PM₁₀ comes from various sources, including road construction and dust, smoke-belching diesel trucks and buses, forest fires, and burning refuse in the open air. Both pollutants can irritate eyes, cause or aggravate a range of respiratory and cardiovascular ailments, and lead to premature death. "It's not air pollution that kills people," explains Muñoz, "but some people die sooner than they would otherwise."

More than 20 researchers from eight academic, governmental, donor, and nongovernmental organizations in Mexico, the Netherlands, and the USA contributed to compiling and analyzing the findings of national and international studies of the health effects of ozone and PM₁₀. Surveys were also carried out "to determine people's perceptions of the pollution problem," says Muñoz.

A population exposure model was then developed, using data from Mexico's sophisticated air-monitoring network. The study estimated that pollution levels in 2010 will be much the same as in the late 1990s when ozone levels exceeded standards on almost 90% of days and PM₁₀ on 30% to 50% of days, explains Dr Victor Borja Aburto, former Director of the Centro Nacional de Salud Ambiental at the Secretaría de Salud and now coordinator of workplace health, who led the project's first module.

Tangible benefits

Earlier efforts to assess the costs of pollution in Mexico City had focused on direct medical costs such as medicines and hospital visits and on productivity losses — income lost by those who were sick. This study, however, sought to provide a more comprehensive picture. Air quality and exposure modelers, epidemiologists and public health specialists, economists and statisticians assessed a wide range of health benefits and "savings," including people's willingness to pay for better health and a potentially longer life. Communications and social participation specialists worked to understand peoples' perceptions and get at indirect costs because, as Muñoz explains, "not only do people who get sick lose days from work, but also mothers stay home to take care of the children who get sick."

It was an important transdisciplinary experience, says Muñoz. Bringing together different disciplines to provide a holistic picture — an approach central to ecohealth research — proved very successful. And a strong connection was forged between the institutions and between government and research institutes.

The research concluded that reducing PM₁₀ would yield the greatest health and financial benefits: each microgram per cubic centimetre reduction would be worth about US\$100 million a year. Reducing both ozone and PM₁₀ by just 10% would result in average "savings" of US\$760 million a year. In human terms that would translate into, for example, 33,287 fewer emergency room visits for respiratory distress in 2010 and 4,188 fewer hospital admissions for the same problem. In addition, says Muñoz, it would lead to 266 fewer infant deaths a year — an important consideration not valued. "Clearly this justifies relatively high expenditures to further reduce polluting emissions," Muñoz says.

Much to the project's credit, this detailed information provided the scientific underpinning of PROAIRE 2002–2010, which calls for close to US\$15 billion of public and private investments in air quality improvement projects. The information has also been made available to the international community through a number of publications.

What do Mexicans think?

If people largely cause air pollution, they must also be involved in cleaning it up. Certainly the original PROAIRE program recognized this and included various formal and informal programs to inform people about the problem and invite them to action. "It recognized that a cultural change was needed to modify the society-city-environment relation," says Muñoz.

But in a city as large and as socially and culturally diverse as Mexico, that proved no easy task. The research team surveyed close to 4,000 residents in all sectors or delegations of the city. Completed questionnaires showed that close to 30% believe the government's motives in seeking to reduce air pollution are self-serving. More than 30% also think that the government's online air quality reports are false. (<http://148.243.232.103/imecaweb/>)

In fact, says Muñoz, "we found that most people don't even consult the official information." They base their perceptions on what they experience: breathing in car exhaust in narrow, clogged, downtown streets, for instance. "If people see the mountains, they say it's a good day. If they can't, they say pollution is high." Close to 40% could not identify any of the government programs to improve air quality. The remainder considered them necessary evils — restrictions rather than preventive measures.

"Don't blame me"

Equally distressing, although everyone recognizes the pollution problem, "people don't see their responsibility for it," says Muñoz. A high percentage blame factories. A smaller number point to vehicle exhaust, which, as Dr Borja points out, is the source of 75% of emissions. "They say that the problem is in other areas — in the northwest, in the downtown, not where I live," adds Roberto Muñoz. "Other people are mainly responsible: my neighbours, maybe, but not me, not my car. My family and lifestyle are not to blame."

And what do people do to cope with pollution? Usually nothing. What are they prepared to do? Very little. And this, says Muñoz, despite the fact that almost all recognize that air pollution is harmful to health and is particularly hazardous for children.

Focus group discussions with men and women at all age levels confirmed that perceptions of the pollution problem were largely subjective. They also confirmed that most are not willing to allocate time or money — or to sacrifice comfort — to alleviate the problem. "It seems that the participation of society is limited to complying with programs," says Muñoz.

This, he says, clearly points to the need for better communication about government programs' successes in improving air quality. Better communication of risks is also needed. "It's clear that information needs to be targeted to individual groups — drivers, women, children," he says. "People need information in a succinct form, they need a consistent message, over a long period."



Photo: R. Muñoz

Community members collaborated in developing targeted training programs and materials.

Seeking solutions

Making people part of the solution, individually and collectively, obviously requires designing new training and information programs. This phase of the project, carried out through the Women's Institute, targeted the women who come to the Integrated Women Support Centres, as well as local political and social leaders. Both groups were chosen because of their spheres of influence, explains Muñoz — women at home and in community organizations, the leaders in the broader community.

The topics covered were defined in collaboration with community members since "their priorities are not limited to air quality control," says Muñoz. They were also interested in ways of improving their social and economic situation, in equitable sharing of responsibilities, and in creating networks for communities to work together. Empowering women to foster social and political changes was a key objective, as was increasing recognition of their decision-making role in the family and community.

This type of community work was a new endeavour for the government, says Muñoz. While existing programs provided information about particular problems, promoting community capacity to solve problems together was new.

Six of Mexico City's 16 delegations were chosen to test the training program: three poor communities in outlying mountainous area where hazards are as abundant as the natural resources, and three more centrally located communities where green spaces have given way to concrete. Working with researchers from the project's first two modules and in collaboration with members of the women's centres, technicians from the Women's Institute translated the technical data into language and actions that everyone could easily understand. Training materials were developed, including colourful posters on which "people recognize the volume of garbage," says Muñoz, "the rats, the dogs in the street, the pollution from industries," just like in their own community.

Promoters were trained to carry out field work and lead workshops. Through games and participatory activities, they helped forge a sense of community among participants. A series of workshops then helped participants understand the issues, identify community problems and needs, and determine their

role in helping solve them. A great deal of attention was given to distinguishing the roles of men and women in preserving both environment and health, in the home and in the neighbourhood.

And “because community participation is tied to obtaining immediate benefits, the issue of sustainable consumption was added to attract and motivate better consumption practices and lifestyles” explains Muñoz — how to save money by using environmentally friendly products, bulk purchasing, etc. “This is particularly important in promoting technologies or alternative fuel programs. We found, for instance, that women weren’t aware of their responsibility because they didn’t have information on the links between energy consumption at home and air pollution, or about how they could reduce that consumption and their costs.”

Finally, individual and collective actions were defined and a support network created to help community members at higher risk — children and the elderly, for instance, or those with chronic diseases. Throughout, the main message was “This is preventable. You can take action.”

There is little doubt that this project has helped shape Mexico City’s long-term air quality policy and programs. And although this type of joint initiative is new, says Muñoz, it bodes well for



Photo: R. Muñoz

Residents readily identified with pictorial representations of neighbourhood problems — garbage, dog feces, rats, etc.

intergovernmental cooperation to attack the problem. It is also a step forward in developing ways of understanding environmental problems that examine the entire cycle and involve populations.

This *Case Study* was written by Michelle Hibler, a writer in IDRC’s Communications Division.

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Ecosystem Approaches to Human Health

Human health and well-being are intimately tied to the health of the ecosystems that sustain life. Yet the potential for improving health by better managing the local environment is an avenue rarely explored in mainstream health programming. Through its Ecosystem Approaches to Human Health (Ecohealth) Program Initiative, IDRC aims to identify the web of economic, social, and environmental factors that influence human health. Communities can then use this knowledge to better manage ecosystems and improve the health of both people and the ecosystem.



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