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Comparative Risk Assessment

Lessons Learned

Environmental Health Project

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“**R**isk assessment” is an analytical procedure for estimating the likelihood that a person or group that is exposed to a harmful substance in the environment will experience adverse health effects. The assessment generates an estimate of the increased risk of specific health outcomes under the particular conditions of people’s exposure. The U.S. Environmental Protection Agency (USEPA) began using risk assessments as the basis for many policy and operational decisions in the mid-1980s. Today, risk assessment is part of the routine practice of environmental professionals in the United States, and its use outside the United States is growing.

USEPA and state environmental agencies in the United States also use risk estimates to compare environmental problems and to assign relative priorities to regulatory programs. Such assessments are known as comparative risk assessments (CRAs). USEPA issued guidance on how to conduct CRAs in 1993, describing the method as “an analytical process . . . to systematically measure, compare, and rank environmental problems.”

The U.S. Agency for International Development (USAID) first used CRA in 1990 and, since then, has commissioned about ten assessments for selected cities, countries, and regions. Although the CRAs conducted overseas have had the same purpose as those in the United States, the methodology differs. First, assessments in developing countries must address the risks of environmentally related infectious and vector-borne diseases, in addition to toxic chemical exposures. Second, USAID-supported CRAs rank environmental problems solely on the basis of their potential effect on public health and do not attempt to evaluate their potential ecological or economic effects.

USAID has used CRAs as input for introducing environment-sector strategies in cities or regions (e.g., Cairo, Egypt; Central America) and for helping central and local governments in host countries set priorities for their ongoing domestic environmental programs (e.g., Bangkok, Thailand; Ahmedabad and Asansol-Durgapur, India; Lima, Peru; and Khulna, Bangladesh).

The Environmental Health Project (EHP) was designed to help USAID missions and host country governments address the full range of environmental health problems. USAID anticipated

that CRA would be an important tool for helping missions develop country-specific environmental health strategies and for helping host country governments set program priorities.

In fact, the demand for CRAs among USAID missions and bureaus has been much lower than anticipated, especially among mission health officers. EHP has conducted only two CRAs, in West Bengal, India, and Khulna, Bangladesh. Both assessments

EHP Goal: Develop, test, disseminate, and apply environmental health risk assessment methods appropriate for use in developing countries.

supported programs in urban environmental management.

The general theme in managing USAID programs for the last five years has been to focus on achieving a limited set of prescribed objectives. This limitation has reduced the breadth of most country programs and, more important, has been a disincentive for

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High Risk Environmental Health Problems in Seven Cities

Environmental Problems	Bangkok Thailand	Quito Ecuador	Cairo Egypt	Ahmedabad India	Lima Peru	Asansol-Durgapur India	Khulna Bangladesh
Deficiencies in Water, Sanitation, and Drainage	✓	✓	✓		✓	✓	✓
Ambient Air Pollution	✓	✓	✓	✓		✓	✓
Indoor Air Pollution				✓			✓
Lead Exposure	✓		✓				
Deficiencies in Solid Waste Management					✓		

Comparative risk assessments in cities of various sizes have consistently found high levels of health risk associated with environmental conditions related to both infectious diseases (water, sanitation, indoor air pollution) and chronic diseases (indoor and ambient air pollution, lead exposure).

missions to expand their programs to cover new topics, such as air pollution and chemical hazards. USAID's Child Survival Program focuses on diarrheal diseases, malaria, acute respiratory infections, vaccine-preventable illnesses, and malnutrition. Traditional epidemiologic methods are sufficient for establishing priorities among these topics. CRA would be appropriate only if the range of problems being considered exceeded the focus topics of Child Survival and included chemical hazards.

EHP is committed to conducting its risk assessment projects in a manner that promotes the development of local institutional capacity. Technical assistance includes basic training in risk assessment methods and support during data collection and analysis. EHP staff serve as advisors; the local organization is fully responsible for implementation. Risk assessment is linked to risk management planning to help ensure that the CRA will be followed up by action to reduce the risks identified. Local participants performing the CRA are more highly motivated if they know it will lead to practical results that improve local conditions.

Technical assistance to institutions for conducting CRAs is a four-step

process. First, counterparts are identified and a workplan for the risk assessment is written. Second, local participants receive training in data collection methods and gather information for the CRA. Third, EHP staff and local participants work together to analyze the information, estimate risks, and rank the problems. The final phase is creation of an environmental management plan.

The assessments EHP conducted in West Bengal and Khulna used the full CRA methodology. EHP has used various methods to characterize health risks for a particular environmental condition in many other places, e.g., lack of water and sanitation (Tunisia, Benin, Ecuador, Bolivia, Jamaica, Haiti), mosquito breeding sites (Gaza, Zambia, Eritrea, Nepal), and exposure to environmental sources of lead (Romania, Egypt). However, these activities did not involve *comparing* health risks among problems for the purpose of setting priorities.

In West Bengal, India, EHP helped a group of local institutions conduct a CRA and develop an environmental management plan in the Asansol-Durgapur district. Asansol is a coal mining area. Durgapur, a well-established center for heavy industry, is listed by India's Central Pollution Control

Board as one of the country's 17 most polluted areas. The Asansol-Durgapur district includes three other towns and surrounding rural areas.

The CRA determined that lack of safe water supplies and adequate arrangements for sanitation pose the highest risk to public health throughout the district, and particularly outside of the industrial districts where major industries provide housing, water and electricity for their employees. More than 70% of people living in the three largest towns were determined to have either an insufficient amount of water readily available or to be using water from a contaminated source. In addition, air pollution was categorized as a priority problem in Asansol because of high particulate levels from coal crushing, transport, and families' burning coal in open piles to produce charcoal.

The resulting environmental management plan included infrastructure projects (water supply and sanitation), strengthened enforcement capabilities for environmental agencies, improved practices for mining and industrial waste disposal, and coordinated pollution abatement actions to improve water quality in the Damodar River. State government officials included new funding in the Ninth Five-

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Year Plan for West Bengal to implement several of the projects on a pilot basis. Other portions of the plan are being used to define new projects that might be taken up by international donors.

Khulna, a port-city, is the third-largest city in Bangladesh. Its population is approximately 750,000, over half of whom live in thatch or semi-permanent housing. The CRA identified three high risk environmental health problems: inadequate water supply, sanitation, and hygiene; indoor smoke from wood fires; and outdoor airborne particulates from transport and industry. Arsenic in groundwater was considered a low risk problem because most residents drink water drawn from deep aquifers that are not contaminated. Information was insufficient to evaluate risks from small and informal industries.

The mayor of Khulna was keenly interested in the CRA and directly involved in developing the environmental management plan, along with a cross-section of citizens. To develop the plan, participants first reviewed the design and results of many projects that had been conducted in Khulna over the last ten years. They then identified the specific problems and locations that should be the focus of future efforts and prepared guidelines for project design. The mayor will use the plan to guide the city's own investments and to gain greater local control over future projects mounted by the central government and international donors.

EHP experience with these CRAs revealed that collecting data can be a challenge for municipal and NGO personnel, for whom the concept of risk estimation may be new. To provide field teams with operational guidance, EHP convened a group of experts in risk assessment, epidemiology, and ethnography to develop a "CRA Data Collection Workbook." A draft version of the workbook was field tested during the CRA in Khulna. Results from the field test are being used to prepare a final version of the workbook.

LESSONS LEARNED

Lesson One: A CRA for a city succeeds only if senior local government officials are involved.

Most USAID-supported CRAs have focused on individual cities, rather than countries or regions. The objective is generally to help the central and local governments set priorities and to catalyze action on the highest-priority problems for the city in question. The CRA is successful if it leads to actions that reduce people's exposure to harmful environmental conditions. In Khulna, the mayor was a chief proponent of the CRA, and his interest kept others effectively engaged. In Ahmedabad, the city manager publicly adopted the results of the CRA and took a personal interest in creating committees to plan follow-up actions.

In contrast, the CRA in Asansol-Durgapur was initiated by state government officials in Calcutta without the full support of either local elected officials or state government personnel with assigned responsibilities for the district. These local officials never felt ownership for the process or the results of the CRA and, consequently, have not acted on its conclusions.

Lesson Two: A CRA can contribute to more effective local governance, if it uses an open process involving all stakeholders.

CRA stakeholders comprise officials from the public agencies responsible for health, environmental management, and planning, as well as representatives of local industries, NGOs, and affected communities. All should be represented on the technical and steering committees, so that they have a role in collecting and evaluating information and a voice in establishing priorities among problems identified.

When stakeholders are involved and there is effective political leadership from a mayor or city manager, this process can result in improved coordination among government departments, better communication between the government and public, and effective regulatory and policy actions.

In Khulna, the mayor and other city officials will use the environmental management plan to ensure that future projects conducted by outside institutions respond more to residents' needs.

In Ahmedabad, where citizens had expressed general concern with high levels of air pollution, the results of the CRA provided the city manager with information to justify a response to their concern. Among other actions, the local government reached agreement with the association of motorized rickshaw drivers to stop using kerosene in rickshaws, restrict traffic on certain roads, and phase out older vehicles, all of which helped reduce air pollution, in return for limiting the number of rickshaw licenses and providing designated waiting areas for passengers.

Lesson Three: Problems should be ranked in a way that facilitates resource allocation and policy decisions within the current government structure.

Most of the CRAs prepared to date, including those supported by EHP, have classified environmental problems into three risk categories (high, medium, and low). This has been useful for motivating new action on high-risk problems that previously had not received much attention. However, it has not been very helpful for motivating changes in existing government programs or for reordering government priorities.

Risk categories do not reflect the structure of a particular city's bureaucracy and budget. It is easier to reallocate resources within an institution (agency, department, or office) than

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across institutions or levels of government. It may be helpful, therefore, to establish relative ranks among the problems for which each institution is responsible, as well as an overall ranking using high, medium, and low risk categories.

Lesson Four: Realigning priorities across agencies and fostering the use of the risk assessment/risk management paradigm require more than a one-time CRA.

Many of the USAID-sponsored CRAs completed by EHP and other organizations have produced useful results: gathering and organizing relevant data in one place; determining the relative health impact of various environmental problems; helping USAID missions and host-country governments decide to take action on a particular environmental health problem; and so on. However, CRAs can also lead to other results: creating consensus about local environmental priorities among groups with conflicting interests; rationalizing environmental standards within and across programs; and, ultimately, reprioritizing regulatory programs and altering the allocation of funds within an environmental agency or among agencies with related functions. These broader results cannot be achieved during a single CRA. They require a long-term strategy for promoting the use of CRA in a country and building the capacity for performing CRAs in local institutions.

Lesson Five: Major responsibility for a CRA should be in the hands of local officials.

CRAs are more effective when the impetus for an assessment comes from

local government authorities with operational responsibilities, rather than from university departments or consulting firms whose primary interest is conducting the assessment. Too often, such "research" institutions operate largely in isolation and are not adept at fostering the kind of collaboration that leads to a successful CRA and follow-up action.

If a university, consulting firm, or other organization is contracted to coordinate data collection or to prepare the CRA report, it must see itself as working for the local government and the steering and technical committees. Furthermore, if more than one organization is contracted to assist in the CRA, experience has shown that making independent arrangements with each organization is more successful than contracting with a designated lead institution and expecting it to subcontract (and, therefore, share resources) with others.

OUTSTANDING ISSUES

Participatory methods for data collection, analysis, and ranking should be expanded. The challenge for the future is to emphasize public participation in CRAs. Those responsible for CRAs need guidance in how to involve a cross-section of stakeholders in both planning and implementation. Unfortunately, the current tendency is to keep the process closed: one small group of specialists, not representative of the stakeholders, performs the analysis and presents it to a small group of key officials. Failure to widen participation is owing to the common reluctance of government officials and academics in host countries to open up

any process to broad participation and to the notion that a CRA is a scientific, analytical process in which lay persons can play only a limited role.

The reliability and credibility of assessments are often compromised by lack of data. The core technical challenges of CRAs are to collect data from which reliable risk estimates can be derived, and to develop meaningful comparisons of the health burden attributable to both infectious diseases and chemical/pollutant exposures. Existing data bases are generally inadequate, and funding for CRAs is not sufficient to develop original data. Therefore, at present, much of the analysis is either qualitative or conjectural. Beyond these problems, there are operational challenges to structuring the comparison of health impacts of different diseases, which have different outcomes for different populations, in a manner that makes the inevitably subjective aspects of the comparison transparent to those who are participating in the ranking process.

These problems do not prevent CRAs from being useful today, but rather point the way for making improvements in the methods for future use.

— *Eugene Brantly, EHP Technical Director for Risk Assessment and Risk Management*

Reports Available from EHP

- "Data Collection Workbook To Support Comparative Risk Assessments." Forthcoming from EHP.
 - "Environmental Health Assessment: A Case Study Conducted in the City of Quito and the County of Pedro Moncayo, Pichincha Province, Ecuador." WASH F.R. 401.
 - "Environmental Health Assessment: An Integrated Methodology for Rating Environmental Health Problems." WASH F.R. 436.
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